The Cotton Gin and Oil Mill

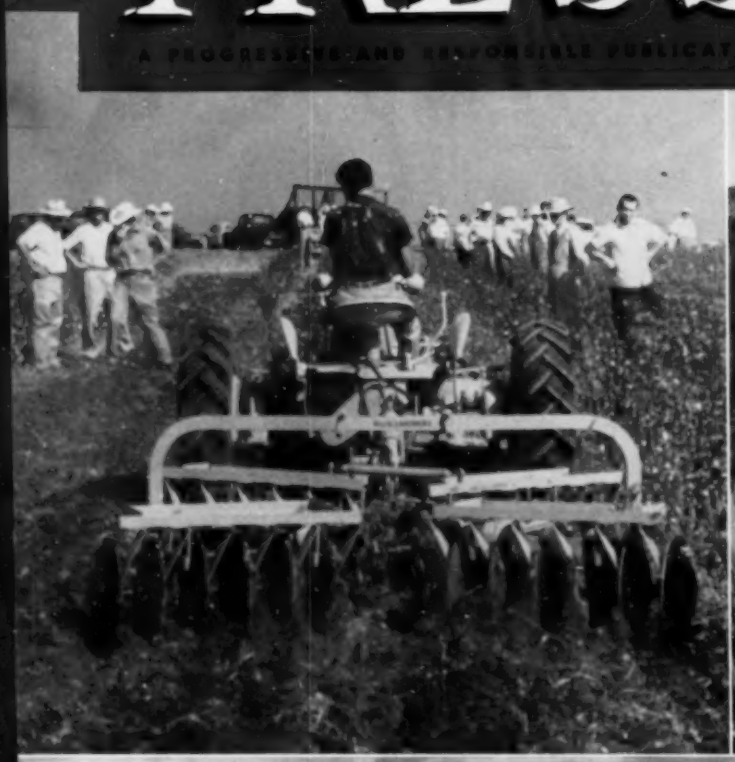
PRESS

OCTOBER 19, 1957

58th year

THE MAGAZINE OF THE COTTON GINNING AND OILSEED PROCESSING INDUSTRIES

A PROGRESSIVE AND RESPONSIBLE PUBLICATION



IN THIS ISSUE:

Proceedings Eleventh Annual Cotton Mechanization Conference

Shreveport, Louisiana
Oct. 2-3-4, 1957

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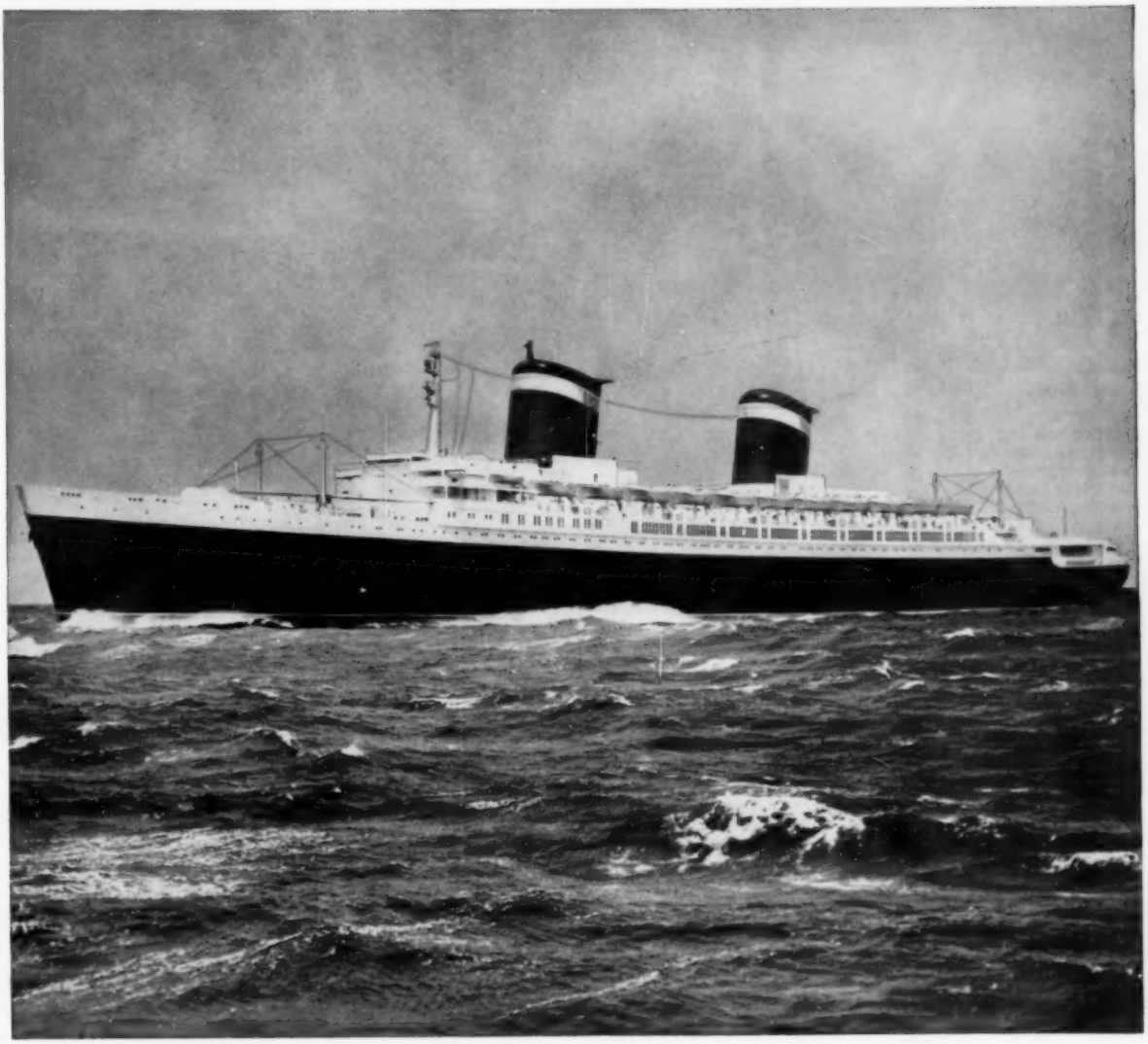

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ON OUR COVER:

Mechanization has been the biggest single development in cotton production since World War II; and one reason has been the annual Mechanization Conferences which have helped producers use the latest developments. These cover scenes are representative of activities at the annual Conferences, which have been held in all parts of the Cotton Belt. The Proceedings of the 1957 Conference, held at Shreveport, La., appear in this issue of The Cotton Gin and Oil Mill Press.

Photos by John Jeter

VOL. 58 OCT. 19, 1957 NO. 21

The Cotton Gin and Oil Mill PRESS...

READ BY COTTON GINNERS, COTTONSEED CRUSHERS AND OTHER OILSEED PROCESSORS FROM CALIFORNIA TO THE CAROLINAS

★ ★ ★

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National Cottonseed Products Association

National Cotton Ginners' Association

Alabama Cotton Ginners' Association

Arizona Ginners' Association

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California Cotton Ginners' Association

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Georgia Cotton Ginners' Association

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Tennessee Cotton Ginners' Association

Texas Cotton Ginners' Association

★

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THE COTTON GIN AND OIL MILL PRESS

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744 Jackson Place, N.W.
Washington 6, D. C.

Published by

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SUBSCRIPTION RATES:

Domestic: 1 year $3; 2 years $5; 3 years $7. Foreign: Latin-American countries $10; all others $15 per year. (Not accepted for "Iron Curtain" countries.) All subscriptions cash with order.

★ ★ ★

EXECUTIVE AND EDITORIAL OFFICES:

3116 COMMERCE STREET, DALLAS 26, TEXAS

A PROGRESSIVE AND RESPONSIBLE PUBLICATION

laugh it off

On a hot day, a boy sat fishing on the edge of a Southern lake. A carload of men, obviously tourists, stopped and one of the men said:

"Son, are there any snakes in the lake?"

"No," said the boy, "I've never seen a snake."

The men peeled off their clothes and went swimming. As they got out, later, one of the men had a thought and asked:

"Say, boy, why aren't there any snakes here?"

Half grinning, the boy answered:

"'Cause the alligators ate all the snakes."

• • •

A man wandered into a tennis tournament one day and sat down on the bench.

"Whose game?" he asked.

A shy young thing sitting next to him looked up hopefully. "I am," she replied.

• • •

The man of the hour is the one whose wife told him to wait just a minute.

• • •

It was near the end of the day and the first aid instructor had answered hundreds of tiresome questions. "If I should come home," said a fluttery little woman, "and find my husband with his head in the oven, and the gas turned on, what should I do?"

As he picked up his kit and reached for his hat, the instructor replied, "Baste him every 10 minutes."

• • •

And now here's a simple suggestion to all you golfers who'd like to cut off four to eight strokes from your score—leave out one hole.

• • •

After the ceremonies were over celebrating the unveiling of a bust of an old college professor a pretty young lady walked up to him and said: "I hope you appreciate me," she cooed, "I came 50 miles to see your bust unveiled."

"My dear young lady," replied the gallant professor, "I would travel a thousand miles to see yours."

• • •

The busy executive asked his secretary where his pencil was.

"It's behind your ear," she replied.

"Come, come!" snapped the busy executive, "I'm a busy man. Which ear?"

• • •

Confucious say: "Wash face in morning and neck at night . . . "

• • •

She: "You are my idea of a fine looking man."

He: "I hope you like to drive your ideas home."

• • •

Wifie: Why are you glaring at me?

Hubby: I just asked Sonny what came after 10 and he smiled at me and replied, "The man next door."

• • •

The pastor of a California church, shaking hands with the congregation as they were leaving the church, greeted a pretty Mexican lass, who was not a regular member, with: "And where do you live?"

She gave him an appraising look and said, "I already got a fella!"

• • •

In the old days the man who saved money was a miser; nowadays he's a miracle man.

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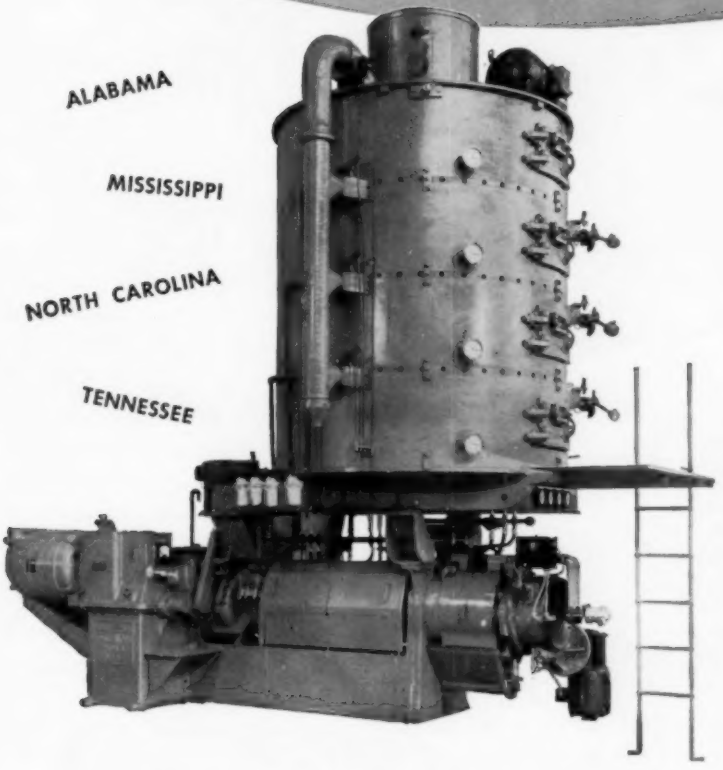

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Relationship of Lint Quality and Moisture Through Harvesting And Ginning

By R. A. MONTGOMERY and O. B. WOOTEN

Summary

PICKING COTTON DRY is highly important to cotton producers and ginners, research reported in this article shows. When early-morning-picked cotton and afternoon-picked cotton were stored in trailers for a period of time before ginning and were given equal drying in the gin, morning-picked bales were almost a full grade lower.

A major part of the grade difference, the authors point out, appeared to be associated with loss of color while the cotton was stored in trailers. The delay in ginning (12 to 72 hours) in this test is comparable to normal delays at commercial gins.

This research was conducted jointly by Mississippi's Delta Branch Experiment Station, Stoneville; and the Agricultural Engineering Research Division, ARS-USDA. R. A. Montgomery is cotton technologist, ARS Cotton Ginning Research Laboratory, Stoneville; and O. B. Wooten is agricultural engineer at the Delta Station.

INITIAL STUDIES at Stoneville, Miss., in the field of lint quality-moisture relationships were designed to evaluate the effect on lint grade of moisture added to the seed cotton while picking with a spindle type picker. It was soon discovered, however, that the moisture content of the cotton depended upon relative humidity of the atmosphere as well as on moisture which might be absorbed from that applied for keeping the picker spindles clean. In fact, the relative humidity of the air showed a greater influence on the moisture content of the cotton than did the rate of moisture applied to the spindles in picking. ("Effects on Machine Picked Cotton of Relative Humidity and Spindle Moisture" by O. B. Wooten and R. A. Montgomery, March 24, 1956, issue of The Cotton Gin and Oil Mill Press, and April, 1956, Vol. 16, No. 4, issue, Mississippi Farm Research.)

Difference in seed cotton moisture prior to picking and associated with atmospheric conditions varied from a high of 16 percent at 6 a.m. to a low of five percent in the mid-afternoon. During the same season, tests showed an approximate increase of one percent in seed cotton moisture when a low rate of moisture was applied to spindles in picking and a two percent increase when a high rate of moisture was applied.

The test reported here was a demonstrative type of experiment whereby cotton from test treatments was picked and ginned under conditions which normally are encountered in commercial gin operations. This test incorporated field effects, delay in ginning or trailer storage effects and ginning effects.

High Moisture and Low Moisture Cotton Picked Under Normal Operating Conditions

This test illustrates the results which may be expected in normal farm and gin operating conditions, where cottons of varying moisture are handled alike. One bale of cotton was picked in the early morning when the moisture content was high. Another bale was picked in the afternoon from the same field after the seed cotton dried to a lower moisture content. Six pickings, or six pairs of bales, were picked throughout the season from Sept. 10 to Nov. 2. Each of these bale lots was held on the gin yard for a period of time ranging from approximately eight hours to approximately 72 hours. This storage period naturally affected lint grades to some extent.

The moisture content of these bale lots of seed cotton ranged from a high of 30.6 percent for one early-morning bale to 8.0 percent for one afternoon-picked bale (Table 1). Each of these bales was given the same amount of drying in the gin, usually enough to insure effective cleaning on the afternoon-picked bale and, in some instances, enough for the morning-picked bale.

Test on High and Low Moisture Content Under Normal Operating Conditions

In all but one instance, the gin drying was sufficient to give what is considered normal ginning. However, in this one exception, although the lint moisture contained was 8.1 percent after ginning, there was no indication of rough preparation. Analysis of the seed cotton moisture after drying and of the lint moisture after ginning showed a significant difference between the morning-picked and afternoon-picked lots, with the afternoon-picked lots being the driest.

It was found that the seed cotton picked in the afternoon under the 1956

(Continued on Page 50)

Table 1.—Seed cotton and lint moisture of early-morning- and afternoon-picked bales ginned with equal drying, Stoneville, Miss., season 1956.

Picking date	Time of day picked	Moisture content		
		Wagon S/C moisture	Feeder S/C moisture	Lint moisture
		Percent	Percent	Percent
Sept. 10	A.M.	17.4	10.8	4.9
	P.M.	12.0	8.7	4.8
Sept. 21	A.M.	16.5	15.0	5.9
	P.M.	14.2	9.3	4.9
Oct. 4	A.M.	23.4	16.5	5.6
	P.M.	15.9	11.0	4.4
Oct. 14	A.M.	17.0	10.6	8.1
	P.M.	11.3	6.8	4.9
Oct. 19	A.M.	15.0	10.3	4.7
	P.M.	8.0	4.5	4.5
Nov. 2	A.M.	30.6	19.4	6.7
	P.M.	17.6	10.8	6.2
Average all	A.M.	20.0	13.8	6.0
Average all	P.M.	13.2	8.5	5.0
Level of significance of time of picking differences		.01	.05	.10

Table 2.—Seed cotton and lint foreign matter of early-morning- and afternoon-picked bales ginned with equal drying, Stoneville, Miss., season 1956.

Picking date	Time of day picked	Foreign matter content		
		Wagon S/C foreign matter	Feeder S/C foreign matter	Lint foreign matter
		Percent	Percent	Percent
Sept. 10	A.M.	5.85	2.06	6.60
	P.M.	6.52	2.44	6.62
Sept. 21	A.M.	6.62	2.62	8.98
	P.M.	12.33	2.21	7.42
Oct. 4	A.M.	6.12	2.32	6.18
	P.M.	5.91	1.92	5.88
Oct. 14	A.M.	6.53	2.58	6.47
	P.M.	6.98	2.16	6.42
Oct. 19	A.M.	5.90	2.13	5.70
	P.M.	8.04	1.59	4.49
Nov. 2	A.M.	6.86	2.42	6.96
	P.M.	7.91	1.96	5.60
Average all	A.M.	6.3	2.36	6.82
Average all	P.M.	8.0	2.05	6.07
Level of significance of time of picking differences		.10	.10	.10

Table 3.—Composite lint grade and classer's staple length of early-morning- and afternoon-picked bales, ginned with equal drying, Stoneville, Miss., season 1956.

Picking date	Time of day picked	Composite lint grade[1]	Staple length
		Index	32nd of an inch
Sept. 10	A.M.	94.7	33
	P.M.	94.7	34
Sept. 21	A.M.	79.0	33.3
	P.M.	93.0	33.7
Oct. 4	A.M.	77.0	33.7
	P.M.	89.0	33.3
Oct. 14	A.M.	81.0	34.0
	P.M.	90.0	34.0
Oct. 19	A.M.	86.7	32.7
	P.M.	95.3	32.7
Nov. 2	A.M.	83.0	33.0
	P.M.	83.7	33.0
Average all	A.M.	83.6	33.3
	P.M.	90.9	33.4
Level of significance of time of picking difference		.05	No significant difference

[1] M=100; SLM=94; LM=85; SGO=78; GO=70.

• Barnett To Head Stacy Company

ARTHUR BARNETT has been elected president of The Stacy Co., Dallas, succeeding the late Louis A. Mindrup, whose death is reported elsewhere in this issue of The Press.

Barnett has been associated with the firm for 30 years and is widely known among members of the cotton ginning industry.

C. G. Holmes, Lubbock business leader who owns a gin at Wolfforth, Texas, has been elected vice-president of the Stacy organization.

Mrs. L. A. Mindrup will continue to serve as secretary.

Barnett announced that the firm will continue to serve its customers with the same sound business principles that have characterized its operations since it was incorporated in 1921.

The Gin Machinery and Supply Association, Inc., elected Barnett treasurer and a member of the executive committee, to succeed Mindrup, at a meeting of the officers and executive committee on Oct. 16.

■ **JAMES D. WHATLEY has been elected vice-president in charge of cotton purchasing of Indian Head Mills, Inc., New York, manufacturers of cotton cloth and coarse yarn greige goods. EARL RUSHON has been named vice-president and assumes the newly-created post of general merchandise manager.**

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Standard samples are available for: (1) Cotton Linters, acetate grade (Buckeye Type 1AR500); (2) Acetate Grade Sulfite pulp (Rayonier's Rayaceta); (3) Prehydrolyzed Sulfate Tire Cord pulp (Buckeye Type V-5); (4) Rayon Grade Sulfite (Riordan's Novocell); (5) Cellophane Grade Sulfite (Rayonier's Rayamo); (6) Rayon Grade Sulfite pulp (birch Swedish pulp); (7) Paper Pulp, regular grade (Swedish pulp); and (8) Paper Pulp, grease proof grade (Swedish pulp).

Large Castor Bean Crop

Twenty million pounds of castor beans will be produced in 1957 from 15,000 acres, Baker Castor Oil Co. estimates. This is the largest output on record, except in 1951-52-53, when Korean War prices stimulated production. The firm expects acreage to rise in 1958.

■ **HASKELL COOKE, formerly Paymaster Gin manager at Santa Rosa, now manages the firm's Presidio gin.**

Heads Research Work

DR. DIAL F. MARTIN became station leader at the Pink Bollworm Research Center at Brownsville, Texas, on Oct. 1. He succeeds Dr. Sloan E. Jones, now with USDA in Washington. A native Texan, Doctor Martin received his B.S. and M.S. from Texas A&M, and his Ph.D. from Iowa State College. He became instructor of entomology at Texas A&M in 1939 and was professor of entomology and in charge of cotton insect research there when he was named to his new position. During World War II he served with the U.S. Army Sanitary Corps in India and Burma.

New Bulletin

MAJOR CAUSES OF GIN FIRES ARE LISTED

"Arizona 'burned up' over a quarter of a million dollars in 1956." This fact, along with a host of others, is contained in a new bulletin, Report No. 159, "Cotton Gin Fires in Arizona—and Their Effects on Marketing Costs," published by the Arizona Experiment Station, Tucson.

Losses from fire represent nearly three times the amount contributed by Arizona growers for cotton promotion during the same period.

"The major cause of 'in transit' fires was smoking. Matches caused the most processing fires. Sparks were the major cause of baleyard fires," the bulletin states. These facts are part of the findings of a Southern regional research project, which has been carried out by Experiment Stations throughout the cotton-producing states, and the Agricultural Marketing Service of USDA.

Copies of this progress report (the study is continuing) are available from Arizona Experiment Station, Tucson.

Alabama Textile Men Hold Statewide Meetings

Several hundred Alabama textile executives converged on the Auburn campus, Oct. 11 and 12, for three meetings of statewide significance, according to Cleveland Adams, head of the Auburn School of Textile Technology.

The program included meetings for laboratory and technical personnel, Alabama textile operating executives, and officers and directors of the Alabama Textile Education Foundation.

D. H. Morris, III, is Foundation president, assisted by Eugene Gwaltney, vice-president; T. Holmes Floyd, treasurer, and Dwight M. Wilhelm, secretary.

Members participating in a panel discussion of technical problems concerning textile manufacturing included John Duerst of Coats & Clarke, Clarksdale, Ga.; Bush Landstreet, U.S. Spinning Laboratory, Knoxville; Jack Simpson, Southern Research Laboratory, New Orleans; Neal Truslow, U.S. Rubber Co., Winnsboro, S.C., and F. B. Benson of Courtaulds, Mobile. Lester Sayers was moderator. Carding and spinning discussions were led by William Curry and John Quenelle.

Exports and Imports Of Linters Decline

Linters exports and imports last season dropped sharply, as compared with 1955-56, USDA reports.

Exports, mostly chemical linters, of 422,000 bales compared with 482,000 the previous season and 312,000 in 1954-55.

Imports were 140,000 bales of linters, mostly felting grades, in 1956-57. This compared with 206,000 in 1955-56. Mexico supplied 86,000 bales and Russia 36,000 of the total linters imports.

■ **WILMER SMITH, vice-president, Plains Cotton Growers, recently presented a $3,000 check to help defray costs of the Lamesa, Texas, USDA cotton classing office, and the cotton organization will make additional contributions in the future.**

• Ferti-Irrigation Results Good

FERTI-IRRIGATION — injection of water soluble fertilizers into sprinkler systems—has proved to be effective and economical in three years of tests in San Mateo County, Calif.

The October issue of California Agriculture, in reviewing research being done on this project, states that approximately 6,000 acres of San Mateo County cropland—planted mainly to vegetables, flowers and pastures, with an annual return of over $5 million—are now irrigated with portable sprinklers.

Sprinklers provide the most efficient method of applying water in the coastal area of the county, with nitrogen, phosphorus and potassium the fertilizers most commonly applied. The injection of fertilizers into the sprinkler system is easily accomplished and, in many cases, is less costly than side-dressings or broadcast treatment.

The ferti-irrigation equipment in general use consists of an airtight pressure tank connected to a Venturi unit placed in the main line pipe. When the sprinklers are operating, water will circulate from the pipeline into the tank and back into the pipeline. By this method, the fertilizer solution can be mixed with the irrigation water.

Some growers have used water soluble nitrogen, phosphorus and potassium compounds for as long as four years with no apparent harmful effects to the sprinkler systems.

The uniformity of ferti-irrigation will only be as good as the distribution of the water. Therefore, it is extremely important that the sprinkler system be properly designed and operated so that the irrigation distribution is as uniform as possible, the article points out.

■ **DR. C. R. SAYRE, Scott, Miss., cotton leader is president of Mississippi Heart Association; and BOSWELL STEVENS, Farm Bureau leader, Noxubee County, is district chairman for the Heart Association.**

Merritt Hill, Frank Hamlin To Address Meeting

Radium Springs, Ga., will be the scene of the seventh annual meeting of the Southern Farm Equipment Manufacturers, Inc., Oct. 30 to Nov. 1.

Merritt D. Hill, general manager of the Tractor and Implement Division of Ford Motor Co., will speak to the group on, "Analyzing, Then Reaching Your Market." Frank H. Hamlin, president, Papec Machine Co. of Shortsville, N.Y., will address members on, "The Short-Line Manufacturer's Place Under the Sun."

Others who will take part in the programs and panel discussions include George H. King, director, Agricultural Experiment Stations, University of Georgia, Athens; R. H. Driftmier, chairman, division of agricultural engineering, University of Georgia; G. W. Giles, head, department of agricultural engineering, North Carolina State College, Raleigh; Fred Kummer, head, department of agricultural engineering, Alabama Polytechnic Institute, Auburn; J. I. Davis, Jr., general manager, Southeastern Liquid Fertilizer Co., Albany, Ga., and John L. Liles, vice-president, Federal Reserve Bank, Atlanta.

Photo by J. M. White.

Pretty Promoters Promote Each Other

PRETTY PROMOTERS of products of New Mexico are shown sampling each other's wares. New Mexico Maid of Cotton Laura Anderson, Roswell, sips a milkshake while Dairy Princess Kay Hubbard, Artesia, feels fluffy "White Gold". Both wear cotton dresses.

Wilt-Resistant Cotton Is Research Subject

University of Tennessee plant breeders are utilizing an irradiation breeding approach in an attempt to cut cotton losses from Verticillium wilt. Such losses frequently run as high as 10 percent of the crop value.

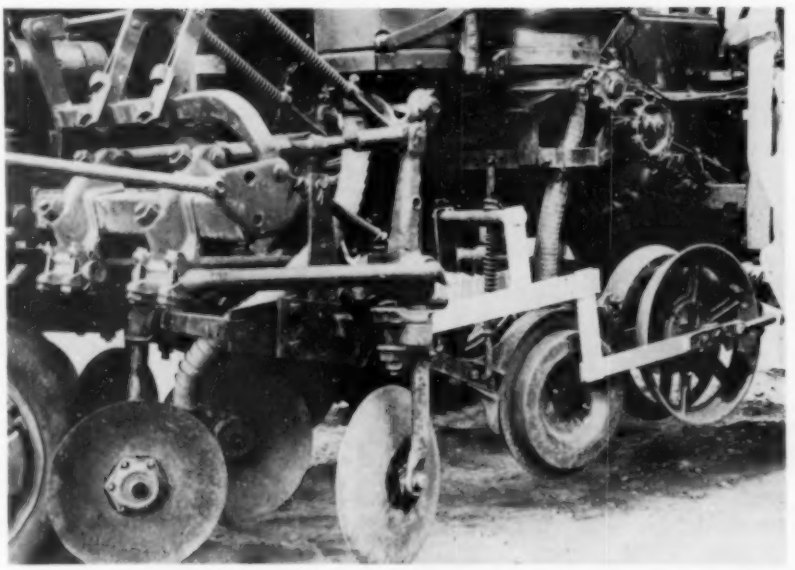
It is emphasized that this radiation type of breeding program will be a long-term project—one that will involve the testing of thousands of progenies from irradiated plants.

Only four plant varieties have been released anywhere in the world that were improved by radiation. Each of these varieties was 12 to 15 years in the making.

This experiment was started last spring. Deltapine 15 cottonseed were irradiated with gamma rays. Greenhouse and field tests for wilt resistance will begin next year. In most cases a desired change is accompanied by one or more undesirable ones. Therefore, any plant showing resistance may have to be used as breeding stock, so that the desired change can be incorporated into a variety worthy of release.

■ **RAY GRISHAM, Western Cottonoil Co., Abilene, immediate past president of West Texas Chamber of Commerce, has been named on the organization's executive committee.**

Planting and Cultivating Cotton In Trashy Soil



THE AUTHOR, shown in top photo, has been a leader in cotton mechanization research. He heads the department of agricultural engineering at the Georgia Experiment Station at Experiment. The lower picture shows a planter developed for clean and trashy seed beds. Disk hillers fill in furrows that are left by the fertilizer opener. Note the spring loading and depth bands on the seed opener.

By
J. G. FUTRAL
Head, Agricultural Engineering, Georgia Experiment Station

A CLEAN, WELL-PREPARED seed bed is always desirable for efficient planting, cultivation and, with some crops, for disease control. However, the ideal clean, well-prepared bed is often impossible to obtain.

Generally speaking, two types of trashy seed beds may be present. If the land is prepared by lightly harrowing, because of dry weather or the need for haste, plant litter will be on or very near the surface of the ground. The second type occurs when a rank cover crop is grown and the soil is too hard to effectively bury the plant material by plowing. In this case the litter is mixed with the soil from the surface down to depths of six inches or more.

Although disk fertilizer and seed openers are recommended, it is possible to fertilize and plant with runner or sword openers when the trash is on the surface. Two disk hillers are set to throw out a shallow furrow just ahead of a knife or chisel-type fertilizer applicator which is set to one side of the row. Most of the litter is swept aside so that stoppages of the fertilizer and seed openers are infrequent. Open center or fish tail drags will clog; therefore, disk covers must be used if any covering device is needed in addition to the packer wheel.

The second condition, where litter is scattered from surface to six or more inches deep, is more difficult to handle. Disk openers must be used for both fertilizer and seed. A single disk fertilizer opener, properly set, will place fertilizer at depths down to five inches in the clay soils of the Georgia Piedmont. This is usually deep enough for cotton.

Double disk seed openers are recommended for several reasons. They will knife through trash, create a minimum of soil disturbance, and require a minimum of additional soil for properly covering the seed.

When the soil is uneven and cloddy, individual spring loading of the seed openers is recommended since this allows them to ride over impenetrable objects quickly with a minimum of skip. For this type of construction, depth control is best accomplished by depth bands attached to the disks.

Aside from their use in trashy soils, disk openers have produced superior stands under both dry and wet conditions when compared to runner or sword openers. Wooten, in Mississippi, has shown their effectiveness in buckshot soils, and McAlister in South Carolina has successfully used them for soybeans following grain.

Cultivation of cotton and other crops may be successfully carried out in trashy soil with the proper combinations of disks and sweeps.

When the crop is planted in a furrow and the farmer wishes to throw dirt to it, a disk hiller may be set just ahead of a flat sweep to clear trash.

Where the crop is planted flat or on a bed and is too small to be dirted, disk hillers are set to bar off followed by disk gangs which throw dirt to the row. These should be set to just fill in the furrows left by the barring off operation and should be large enough to cultivate from middle to row since rear mounted sweeps will drag trash. Later, when the plants are larger, the disk hillers are removed, and the disk gangs set to throw the desired amount of dirt. They should be set far enough from the row to minimize root pruning.

• Procter & Gamble Co. Names Directors

PROCTER & GAMBLE CO. shareholders have elected four new directors, replacing retiring board members. R. R. Deupree was chairman of the annual meeting held in Cincinnati.

The new directors include Edgar Gordon Burton of Toronto, president and chairman of Simpsons, Ltd. and Simpsons-Sears, Ltd., a leading department store and mail order organization in Canada; Reuben B. Robertson, Jr., president of Champion Paper Fiber Co., Hamilton, Ohio; Robert S. Oelmah, president of National Cash Register Co., Dayton, Ohio, and W. Rowell Chase, vice-president of advertising for P. & G. Burton becomes the first P. & G. director from outside the U.S., while Robertson is returning to the board after serving two years as Deputy Secretary of Defense.

Chase was elected vice-president of the soap product division and will head the company's soap and detergent operations in this country. E. A. Snow succeeds Chase as manager of the advertising department. T. J. Wood, vice-president-sales, will continue in that position in a staff capacity.

The new directors replace Neil H. McElroy, president from 1948 until Sept. 30, 1957, who is now U.S. Secretary of Defense; R. K. Brodie, chairman of the board of the University of Cincinnati; J. J. Rowe, chairman of the Fifth Third Union Trust Co. of Cincinnati and Charles W. Dupuis, chairman of Central Trust Co. of Cincinnati.

Sponsors of Cotton Bills Honored at Luncheon

Senator Stuart Symington and Congressman Paul C. Jones were honored at a luncheon Oct. 7 by the board of directors of the Missouri Cotton Producers' Association in Hayti, Mo.

The guests of honor were introduced by Hilton Bracey, executive vice-president of MCPA. Crews Reynolds, a member of the board of directors, and Roger Rhodes, president of MCPA, officially thanked both legislators for their energy and devotion to the cause of the cotton farmer.

A. L. (Abbey) Story, recently retired as president of the American Cotton Producer Associates, and Ronnie F. Greenwell, an active member of the legislative committees of both Missouri Cotton Producers' Association and American Cotton Producers' Associates, expressed thanks to the guests for the help given the committees on frequent trips to Washington.

Swine Gain on Feather Meal

Feather meal in balanced rations for swine gave results comparable to rations containing soybean meal in Tennessee Experiment Station tests. O. Glen Hall reports the results in the current issue of Tennessee Farm and Home Science. Average daily gains were virtually identical on the rations compared.

■ **E. E. KRESSENBERG, a past president of Tri-States Oil Mill Superintendents' Association, now is with Walker & Son, contractors, Memphis.**

Drew Watkins Honored for Twenty Years as Ginner

Drew Watkins, Sudan, Texas, ginner and civic leader, was honored at an open house at the Watkins Gin Sept. 30 as he marked his twentieth year as a ginner.

During his years in the ginning business Watkins has noted changes in farming: "When I first came to this country there was only one irrigation well east of town and cotton was gathered mostly by hand." A native of Arkansas, Watkins was born in Batesville, attended Oklahoma A&M, served as a coach and was engaged in the dry goods business before going to Sudan.

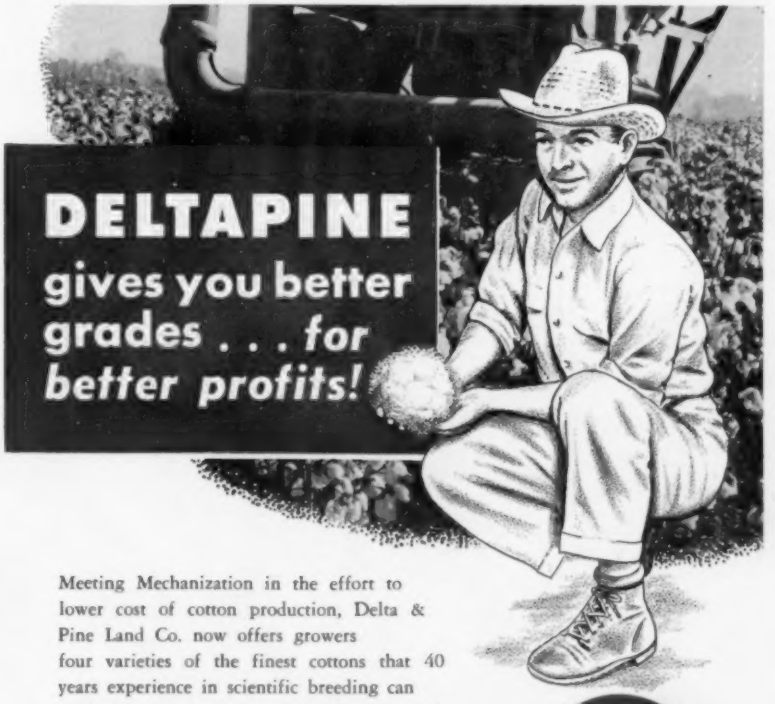
Several of his original customers still are ginning with him while others have been born and reared since he came.

Mrs. Watkins was on hand for the celebration also.

• Tung Oil Association Names Officers

AMERICAN Tung Oil Association reelected officers at its recent annual meeting. Marshall Ballard, Jr., Lumberton, Miss., is president; L. O. Crosby, Picayune, Miss., and Otis A. Rosborough, Marianna, Fla., are vice-presidents; and Roland R. Becke, Poplarville, Miss., is executive secretary.

Directors are Dr. P. E. Daniels, Irvington, Ala.; P. T. Eubanks, Sumrall, Miss.; Mrs. Ellen S. Woodward, Washington; Heber Ladner, Jackson, Miss.; T. H. O'Connor, Milton, Mass.; W. F. Warren, Lumberton, Miss.; G. E. Carter, Port Arthur, Tex.; Robert Tonner, Bogalusa, La.; Rafe Silverstein, New Orleans; J. Riley Rankin, Poplarville, Miss.; and W. L. Fuller, Washington.



Meeting Mechanization in the effort to lower cost of cotton production, Delta & Pine Land Co. now offers growers four varieties of the finest cottons that 40 years experience in scientific breeding can produce—cottons that machine harvest with minimum loss of grade, and consistently produce high yields of fine quality fiber.

New Deltapine Smooth Leaf is the latest achievement, and another FIRST for the "Breeders of the Belt's Best Cottons." Reservations for your Registered Deltapine seed should be made now.

D.&P.L. CO. ORIGINATORS OF DELTAPINE PLANTING SEED

Four Famous Varieties

DELTAPINE 15
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DELTAPINE STAPLE
DELTAPINE SMOOTH LEAF

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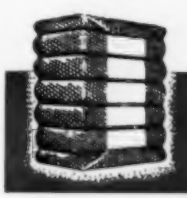


BREEDERS OF THE BELT'S BEST COTTONS

DELTAPINE COTTONS
Breeder's REGISTERED Seed

from our Washington Bureau

by FRED BAILEY

WASHINGTON REPRESENTATIVE

The COTTON GIN and OIL MILL PRESS

• **New Cotton Plan** — USDA has reported to Congress on a plan which economists estimate would increase production of cotton to 20 million bales and lower market price to 19 cents per pound.

The program isn't the Brannan Plan, although the two are certainly of the same parentage and bear striking resemblance.

Brannan would have kept controls over production, and would have retained a loan program for non-perishables. The scheme USDA has studied—at the request of Congress — would abolish all controls, would do away with loan programs, and would make direct payments to farmers equal to the difference between 90 percent of parity and market price.

USDA neither endorses nor rejects a direct payment program—it only tells lawmakers what it thinks would happen to production, to prices, to consumption, and to government costs were such a program made law.

• **Oppose Direct Payments** — But top policy men from Benson down make no bones about hoping that the Brannan Plan—along with all of its aliases, such as this one—will be laid to rest, once and for all. Staggering cost figures included in the study are obvious inducement to Congress to handle burial details.

USDA looked into the workings of a direct payment kind of program under two sets of assumptions. First, if payments were made on all production; and, second, if payments were made only on average 1952-56 disappearance. For most commodities—including cotton—the results would be much alike, however. In both instances production would jump to 20 million bales and price would fall to 19 cents per pound by 1962.

Here's how official estimates were made:

ACREAGE—If price supports for cotton only were hiked to 90 percent of parity and acreage controls were abolished, acreage would increase to near 25 million. Past experience shows this. But, if all other commodities—including livestock and livestock products—were also supported at 90 percent of parity, cotton acreage would be slightly smaller. The reason is that production of livestock and of feed grains would become more profitable and would take over some land otherwise used for cotton. So, the estimate of cotton acreage under a direct payment plan is lowered to 23 million acres.

YIELDS — Average 1962 yields would be about the same as this year. Here's why: With a big increase in acreage, land would be cultivated less intensively than now, and yields would drop. But, by '62, new technology would return per acre production to a level not much different from now. Acreage times yields at the estimated level gives production of 20 million bales.

PRICES—The estimate of 19 cents per pound is admittedly rough . . . and may be off a cent or two in either direction. What it represents is the best guess of Cotton Branch officials.

DISAPPEARANCE — Under a direct payment program, all cotton produced would be consumed, or added to trade inventories. So, disappearance of 20 million bales annually is estimated. The breakdown is figured to be in the neighborhood of seven million bales in foreign markets and 13 million bales in the domestic market. That compares with average 1952-56 disappearance of 13 million bales, and disappearance this year estimated at 14 million bales.

The big gains in consumption, officials think, would result largely from the 19-cent-per-pound price being offered to all buyers—domestic users and exporters.

The big drawback to a program of direct payments would be cost to the government. Economists say costs would soar from $2 billion now to $7,300,000,000 if payments were made on average 1952-56 disappearance, and to $10,600,000,000 if made on unlimited production.

Payments on cotton would be near $1,400,000,000 and on cottonseed about $75 million, USDA estimates. Growers' income would be increased, but by an amount short of $1,400,000,000. Officials say the lower market price per pound would more than offset the increase in production.

• **Would Aid Processors** — A "Brannan Plan" type of program, economists conceded, would have substantial benefits to ginners and to crushers. Volume at the gin would show a big gain. Prices would be at a level which would stimulate consumption in both domestic and foreign markets. Increases in foreign production would tend to be slowed. And, cottonseed oil would tend to grab a larger share of the edible oils market as less—rather than more—soybeans were produced. The explanation for smaller soybean acreage is that much of the land needed for feed grain production would be at the expense of soybeans.

Don't expect the controversy over pros and cons of direct payments to end with the USDA report. Congress is digging deep in the archives of farm proposals in hopes that it can uncover a program which hasn't been tried.

So, here's what you can expect: When Congress returns—or possibly before—there will be demands for additional direct payment studies. The economic assumptions will be laid down by the lawmakers, not left to USDA. Congressmen will want to know what cost to the government would be if: (1) the price ob-

Cotton Leaders Confer in Europe

REPRESENTATIVES of Cotton Council International and National Cotton Council of America are pictured meeting with German Cotton Institute in Frankfurt where they discuss operation of cotton sales promotion programs in Germany. Group included Wm. Rhea Blake (fourth from left), executive vice-president of Council and CCI, Memphis; Gen. Everett Cook (fifth from right), president of CCI, Memphis; and Dr. C. R. Sayre (far right), president of Delta and Pine Land Co., Scott, Miss. Others in photo (left to right): Raymond Steinbach, European director, CCI; Dieter Frank, Institute; Dr. Kurt Klotzner, director, German Cotton Weavers' Association; Blake; Rudolf Renner, director, Institute; Willy Kohler, director, German Cotton Spinners' Association; Read P. Dunn, Jr., executive director of CCI; Erich Coenen, German Cotton Spinners'; General Cook; Paul Kumpers, millowner; Fran Rudolf Kumpers, millowner; Hans L. Merkle, chairman of board, Institute; and Doctor Sayre. The U.S. group also met with cotton representatives in other countries, and will return about Oct. 25.

jective was something less than 90 percent, say 85 percent, (2) Direct payments were not applied across-the-board to all crops and all livestock, (3) some controls on production were retained, and (4) of production used for domestic conpayments were made only on that part sumption.

• Do-It-Yourself Fan Really Does It

ALLEN SMITH of Memphis, head of the chemistry laboratory and mill operating engineer at Perkins Oil Co., was the subject of a recent feature article in the Memphis Press-Scimitar.

Seems Smith has outdone himself doing things himself this year. He built a car for his 12-year-old son Jeffrey. It is painted red, powered by the motor from a power lawnmower and features two-wheel brakes.

For his 14-year-old daughter Suzanne he built a playroom, 15 by 27 feet, across the back of the house, which features built-in cabinets for the TV set, record player, radio, air conditioning unit and for a supply of card tables and extra chairs.

For his wife he has constructed brick walls and a terrace in the front of their home.

Then he topped the entire project off by getting a "do-it-yourself" certificate, beautifully inscribed to himself, which he framed and nailed to the playroom wall.

Textile Educators Will Visit Midsouth Area

Leaders responsible for programs to prepare young men and women for careers in textile industry will visit Midsouth areas to view the progress in cotton production, marketing, merchandising, and processing. National Council for Textile Education, is sponsoring the group's visit, Oct. 28-30.

The itinerary has been arranged through cooperation of the Delta Council and industry leaders. Leaving Memphis, Oct. 28, the group will travel through the Delta to Greenville, where W. T. Wynn, former National Cotton Council president, will be dinner host. Schedule for Tuesday includes field demonstration of production practices at the Delta Branch Experiment Station, tour of USDA ginning and fiber laboratories, participation in cotton picking contests, and dinner as guests of Delta & Pine Land Co.

The group will return to Memphis the following day where the Council program will be described at luncheon. A visit to the Memphis office of Anderson, Clayton & Co. will conclude activities.

Robert T. Moore Dies

Robert Talley Moore, former Germantown, Tenn., cotton gin operator died Oct. 12 in Memphis, after an illness of about four years. He was 83.

Born in Germantown, Moore operated a cotton gin and was in the saw mill business before moving to Memphis about 15 years ago.

He leaves his wife, Mrs. Grace Moore; three sons, Clifford B. Moore, Sr., of Memphis, Emil R. Moore of Brookings, Ore. and Murray W. Moore of Oak Ridge, Tenn.; and two daughters, Mrs. I. M. Brooks of Memphis, and Mrs. John Carroll of Concord, Calif.

P. A. Fleming, Sr., Dies

Partee Augustus Fleming, Sr. of Memphis, former druggist, cotton man and furniture dealer, died Oct. 10. He was 76.

As a youth Fleming was a cotton buyer, traveling along the Tennessee and Mississippi Rivers. During 1923-25 he operated a cotton oil mill and several gins at Augusta, Ark. In the next three years, he operated a grain elevator, flour mill and several gins in Charleston, Mo.

He is survived by his wife, a sister, Mrs. William Tufts; two brothers, Earle Fleming and Walter Fleming all of Palmdale; two sons, Partee A. Fleming, Jr., and William P. Fleming, of Memphis and three grandchildren.

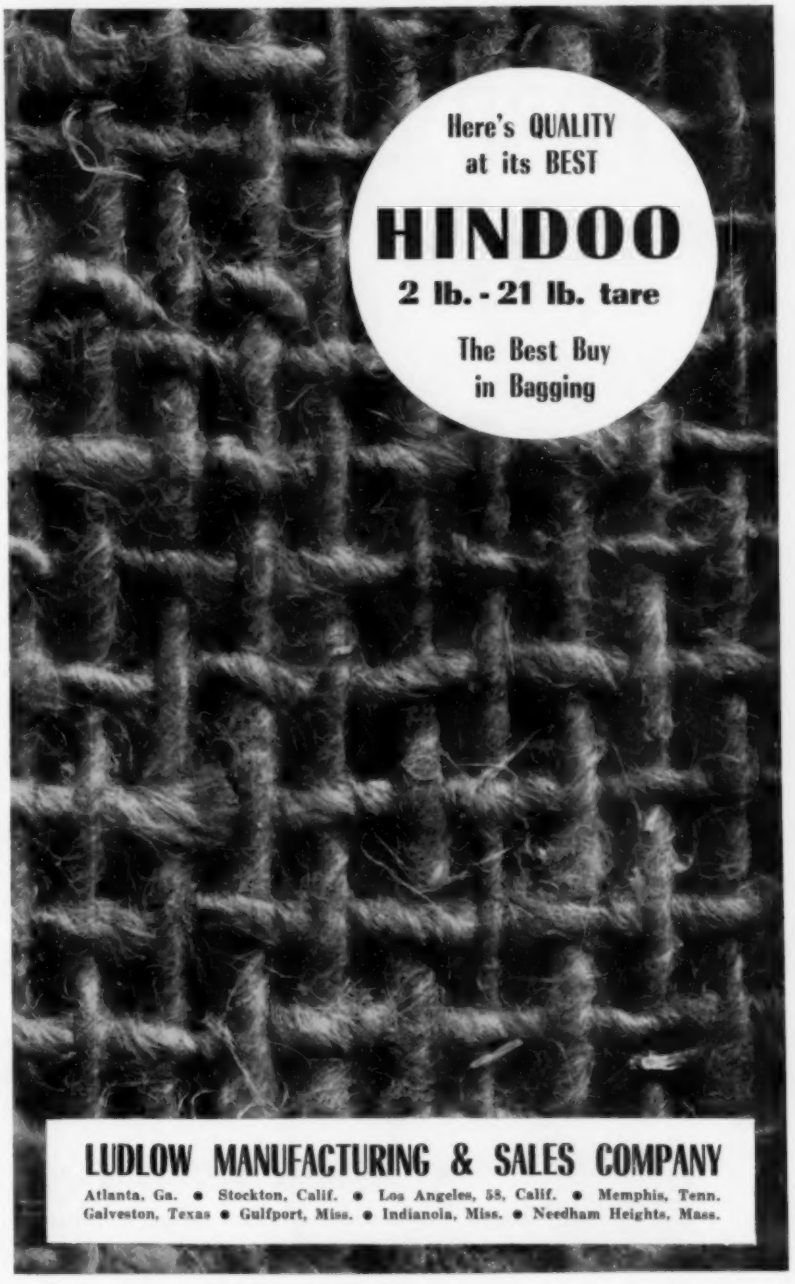
New Bulletin

AERATION OF GRAIN CUTS COSTS IN STORAGE

USDA reports that 60 percent of the normal costs of turning stored grain can be saved by the use of aeration systems developed through marketing research.

Single copies of the report, "Aeration of Grain in Commercial Storages," Research Report No. 178, may be obtained free from Office of Information, USDA, Washington 25.

■ **HARRY ELLETT, manager of the Southland Mill at Richmond, Texas, has been with Anderson, Clayton & Co. 32 years.**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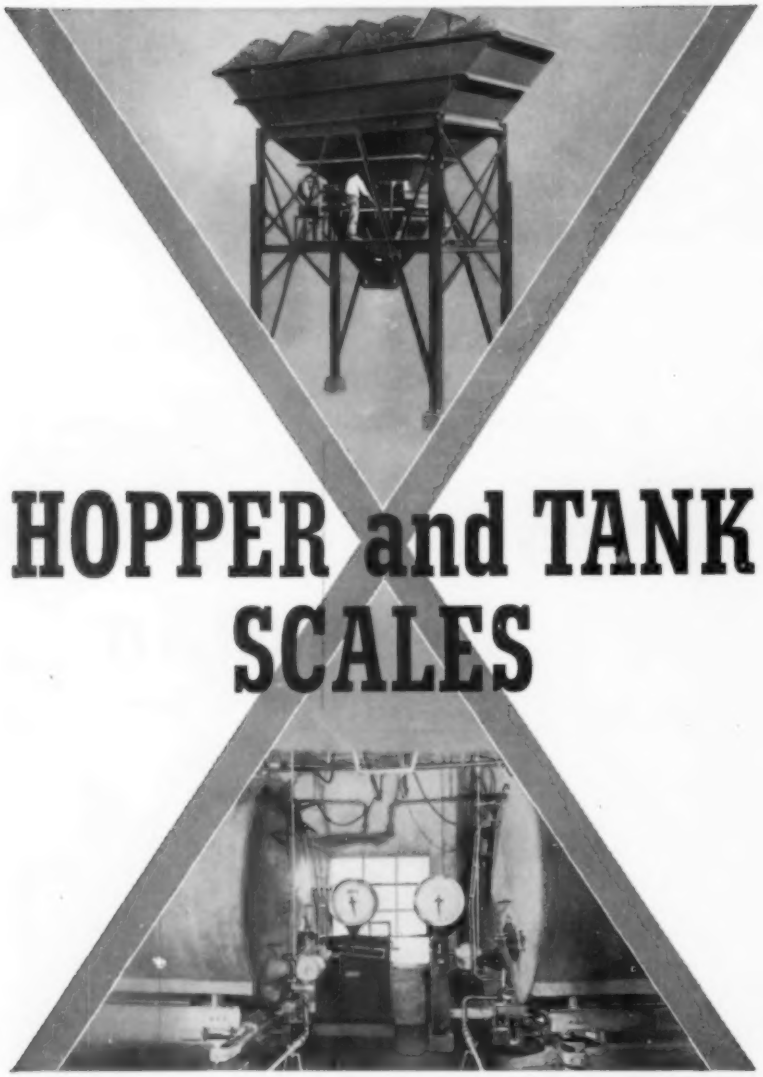

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HOPPER SCALES. For batching, charging, proportioning, filling, compounding and processing. Capacities from 500 to 120,000 lbs. For square, rectangular or cylindrical hoppers. Howe lever action assures rugged and accurate service.

TANK SCALES. For all types of tanks mounted vertically or horizontally. Simplified pipe lever system for supporting and weighing all tank loads from 500 pounds to 110 tons. Low corner mounting stands permit easy installation in areas with low ceilings or limited floor space.

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RUTLAND • VERMONT

Owner's Lost, Not His Notebook

An owner has been lost by a notebook which found its way home to The Cotton Gin and Oil Mill Press.

In 1952, The Press printed and distributed small books for those wishing to take notes at the 1952 Cotton Insect Control Conference in Memphis. Last week, one of these five-year-old notebooks, with current notes in it, came to The Press office. The notebook had been found in the press room at the 1957 Beltwide Cotton Mechanization Conference in Shreveport.

The owner may secure his notebook by identifying his notes in it.

New Mexico Plans Second Water Conference

A second New Mexico Water Conference will be held at New Mexico AM College, Nov. 7-8, according to Dr. H. Ralph Stucky, head of the department of agricultural economics and chairman of the A&M committee arranging the conference. The theme for the conference will be "How to Make Use the Best of New Mexico's Scarce Water Resources."

The conference will permit discussion of New Mexico's acute water problems and promote public understanding of these problems. The public is invited to participate.

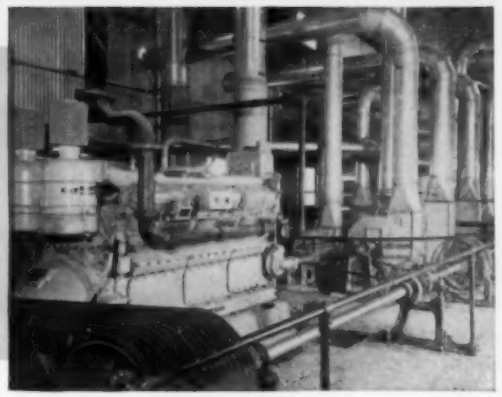
■ **ANNA PUCKETT, daughter of the E. L. PUCKETTS, Amory, Miss., and MARILYN WILLIAMS, daughter of the W. A. WILLIAMS, Abilene, Texas, are among freshmen coeds at SMU this fall from oil mill industry families.**

Cotton Dress Wins

JORJA HUE BLACKMON, left, is shown receiving a check as her award for the best cotton costume in the Texas 4-H Dress Review at the State Fair in Dallas. Jack Whetstone, secretary-treasurer of Texas Cottonseed Crushers' Association, presented the award for the donor, Roy Davis, Plains Cooperative Oil Mill, Lubbock. Twenty-eight of the 49 entrants in the contest had costumes made entirely of cotton; most of the other entries contained one-half or more cotton.

"...and it's doing right fine!"

F. M. Burkhalter, *president*



There's quite a story back of this new gin and its CAT* D397 Engine.

Early in 1956 twenty people around Philipp, Miss., formed the Macel Co-operative Gin Company. The stockholders heard sales talks from five different engine manufacturers, then took a vote. On the second ballot they were unanimous for the Caterpillar D397, even though it cost somewhat more. The main reasons were that the many Cat Engines in the neighborhood were all well liked, and the nearby Caterpillar Dealer offered 24-hour service. F. M. Burkhalter, president of the company, says: "This engine is a good long-range investment . . . and it's doing right fine!"

The D397 drives a 4/90 Hardwicke-Etter gin, two vertical butane dryers, burr, stick and leaf machine, inclined cleaner, four lint cleaners, single story press and nine fans. The engine has plenty of power for steady ginning—it's rated at 360 HP in continuous operation —and the even flow of power makes good samples.

Cat Cotton Gin Engines are built for the purpose, specially protected from lint and dust. They burn low-cost fuels without fouling. And if natural gas is a cheaper fuel in your area, Caterpillar Spark Ignition Engines are now available, giving you the same dependable performance. Today, engines that come from the Caterpillar plant bear a signed, notarized *certificate* covering their power capabilities. Another Caterpillar first!

Your Caterpillar Dealer has the right engine for your needs, with *certified* power. You can depend on him for prompt, round-the-clock service and original Caterpillar parts. Call him today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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as viewed from The "PRESS" Box

• Beltwide Conference Proceedings and Comments

MECHANIZATION DEVELOPMENTS in cotton are summarized in a special section of this issue of The Press. These papers are published as a service to the industry, through the cooperation of the National Cotton Council, which reprints this material and distributes it as the official proceedings of the annual Beltwide Cotton Mechanization Conference. Heard around the hotel lobby in Shreveport, during the Conference, were comments and discussions—entirely unofficial—as interesting as the formal talks. Some of these were:

—COTTON FOOTS THE BILLS for research with livestock and other crops at many Experiment Stations. Revenue derived from growing cotton isn't all used for cotton research, but often goes for breeding studies with beef cattle or for other purposes. "Isn't cotton entitled to the research that cotton dollars can buy?" cotton industry folks are asking.

—COTTON MEN ARE CONFUSED by boll weevil "resistance" and conflicting state recommendations on poisoning insects. They know that toxaphene-DDT effectively controlled weevils in Louisiana this season in tests where early-season control was practiced. And yet, some states don't recommend the practice or the materials. Farmers think everyone should get together and determine the best thing to do, then do it.

Confused, also, were some of those attending the Conference who drove past the pink bollworm inspection stations at the Louisiana border. Some cars weren't stopped at all. Some were stopped and asked to "declare" any cotton they had. Many agricultural workers question the effectiveness of these inspection stations, and think the same dollars invested in cooperative pink bollworm research would pay Arkansas, Louisiana and Mississippi bigger dividends.

• Let's Keep It Clean

EVERYONE AGREES that everything possible must be done to keep cotton quality high and competitive. Everyone agrees, too, that growers and ginners, jointly, can do more than anyone else to maintain quality. Here are some timely reminders of things to do:

TAKE DRY, CLEAN COTTON to the gin. Doing this can mean about one grade difference in value, research in Mississippi, reported in this issue of The Press, shows.

USE GOOD BAGGING. Warehouses are complaining about bales with inferior bagging and with heads of bales not completely covered, Georgia Cotton Ginners' Association reports. "If the producer is turned down because the bagging on his bale does not meet the requirements to enter the loan," the Association points out, "he no doubt will find another ginner next season."

SAMPLE CAREFULLY. Cotton sampling methods bring about as many complaints as anything we know. Samplers should be cautioned to do the minimum damage to the bagging and the bale.

• Press Useful Abroad

FOREIGN READERS probably study The Press more carefully than the great majority of readers in the U.S., letters from abroad indicate. That they find much useful material is apparent from their letters—such as the recent comment from Alberto Viller, an exporter and importer.

He wrote from Buenos Aires, "You can be sure that we find your publication very interesting and get a good deal of valuable information out of it."

• Must Be Good Classers

GINNERS, say the recent Memphis National Bank of Commerce cotton newsletter, "who buy cotton at the gin must be good classers this season. There is a difference in loan value of almost $17 per bale between Middling and Strict Low Middling." Discussing the possibili-

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Cen-Tennial Cotton Gin Company is in a position to supply you with the most modern gin plant on the market, including these ***specialized*** lines:

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Write Today for Further Information

Cen-Tennial **COTTON GIN CO.**

DALLAS, TEXAS · COLUMBUS, GA. · MEMPHIS, TENN.

ty of much low-grade cotton this season, the bank comments, "We would not be surprised to see a CCC loan in excess of six million bales."

• Potent Potion

FLAMING PURPLE PASSION is a popular drink at Albuquerque which apparently lives up to its name. When a bartender lighted one recently it: 1. Burst into large flames; 2. Burned the blouse off the waitress; 3. Sent her to the hospital with second degree burns.

• Want U.S. Fats

FATS AND OILS from the U.S. are badly needed in Iron Curtain areas, as is American cotton. Poland and Yugoslavia may get more of these products, the Wall Street Journal predicted recently, although the U.S. State Department dreads the outcry that may result.

• Diet Foods

DIET FOOD BUSINESS today is big business, newspaper food editors were told at the 1957 conference held in Chicago, early in October. Alan Randall, vice-president in charge of sales for Monarch Foods, canners and processors, (who have a selection of 130 diet food products) stated, "Since 1953 retail sales of diet foods have more than quardrupled . . . and sales will probably continue to grow, for overweight is today's No. 1 health problem."

• Gin Machinery Leader, Louis Mindrup, Dies

LOUIS A. MINDRUP, president of the Stacy Co. in Dallas and one of the gin machinery industry's best-loved leaders, died Oct. 8 at a Dallas hospital.

A native of Illinois who had lived in Dallas for 35 years, Mindrup was 71 years old.

Mindrup was a friend of many ginners throughout the Southwest and other parts of the Cotton Belt. As treasurer of

LOUIS A. MINDRUP

the Gin Machinery and Supply Association, he helped for many years in that organization's program of providing outstanding exhibits and entertainment at the annual conventions of Texas Cotton Ginners' Association.

He was an active Elk, Mason and Shriner.

Survivors are his wife and two brothers, Fred Mindrup of St. Charles, Mo., and C. A. Mindrup of Edwardsville, Ill.

Services were held Oct. 10 in Dallas.

J. E. Coyle, Ginner, Featured in Article

J. E. Coyle, ginner at Rowlett, Texas, was featured in an agricultural column in the Dallas Times Herald on Oct. 11. In 45 years of ginning, Coyle estimates that he has ginned 100,000 bales of cotton.

The ginner practices soil conservation on his farms and raises Hereford cattle. He operated a dairy until a few years ago.

Mr. and Mrs. Coyle married 56 years ago and without a dollar. They have now 3,700 acres of good farm pastureland, well-equipped, up-to-date gin, other properties, eight children, 15 grandchildren and seven great-grand-grandchildren—all living.

"My ambition was to leave each of my eight children—six girls and two boys—100 acres of good blackland. I always liked to build big and still do. There were plenty of times, however, when I questioned whether I would reach my goal. I always urged young men: go in debt if necessary to make money. Make your plans big and then make your plans work."

Mother of Ginner Dies

Mrs. Viola Wendell, El Campo, Texas, died Oct. 2. Survivors include her son, A. J. Wendell, a director of Texas Cotton Ginners' Association.

BRADEN STEEL IMPLEMENT SHEDS

When the cost of a Braden **steel** fireproof implement shed is compared with the cost of an **insured wooden** implement shed of the same size—you will find the sturdy, easy-to-erect Braden Steel Implement Shed is by far the best buy Write today for prices.

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Conference Will Hear Presidential Assistant

Jack Z. Anderson, administrative assistant to President Eisenhower, will be among speakers at the irrigation conference being planned by the newly-formed Texas Inter-Industry Irrigation Council, Nov. 14-15 in the Lubbock Hotel, Lubbock.

Anderson will speak on "Irrigation Farming—A Key to Better Living," before farmers, agricultural leaders and members of the irrigation equipment industry.

Covering the entire field of irrigation will be such authorities as Guy Woodward, education director of the Sprinkler Irrigation Association, Salt Lake City; Dr. Ivan D. Wood, irrigation consultant, Denver; Dr. Moyle Williams, chief agricultural economist, National Plant Food Institute, Washington; E. V. Dignan, vice-president, U.S. National Bank, Denver; Dr. T. R. Timm, head of department of Agricultural Economics and sociology, Texas A&M College.

Dr. Robert Hagan, chairman, department of irrigation, University of California, Davis; Dr. Marlowe Thorne, head of agronomy department, Oklahoma State University, Stillwater; J. W. Pruitt, irrigation farmer, Inverness, Miss.; experts from several leading irrigation equipment companies and others.

■ **W. B. CAMP, Bakersfield, Calif., cotton leader, has been elected vice-president of the U.S. Chamber of Commerce.**

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Texans to Vote on Water Development Fund

Texans will go to the polls Nov. 5 to vote on an amendment to the constitution, providing for the issuance and sale of state bonds to create a fund to be known as the Texas Water Development Fund.

The Fund will provide financial assistance to certain political subdivisions for the conservation and development of water resources of the state. The amendment will also provide for the creation of an agency to administer the Fund and to perform certain other duties.

This agency would be known as the Texas Water Development Board.

Carlisle Co-operative Gin Holds Formal Opening

Formal opening of the Carlisle, Texas, Co-operative Gin was held Oct. 1. Following a barbecue supper, a tour of the gin was held. J. R. Morrow is manager.

The gin, which is located one mile south and one mile west of Carlisle, features the latest equipment for bur and trash removal before ginning and for lint cleaning after ginning.

Men Outclassed

FEMININE cotton classers were unheard of 75 years ago, when the Garrison family entered the cotton ginning business at Homer, Ga. Now, they're proud to have a member of their family who can outclass men in evaluating cotton and in looks, too. O. C. Garrison, ginner, on the left, operates a modern gin with the help of two sons, Herbert and Buster, and their wives. Mrs. Herbert Garrison, one of the daughters-in-law, is shown sampling and classing cotton—a job she does regularly at the gin.

LEADERS who participated in the opening session of the eleventh annual Beltwide Cotton Mechanization Conference are shown here. Left to right are Dr. Coyt T. Wilson, assistant dean of agriculture, Alabama Polytechnic Institute; Dr. J. N. Efferson, dean of agriculture, Louisiana State University; Lamar Fleming, Jr., chairman of the board, Anderson, Clayton & Co., Houston; Cecil Collerette, chairman, production and marketing committee, National Cotton Council, Casa Grande, Ariz.; and Claude Welch, director, production and marketing division, National Cotton Council, Memphis.

Proceedings:

Eleventh Annual Beltwide Cotton Mechanization Conference

THE FOLLOWING MATERIAL contains the proceedings of the eleventh annual Beltwide Cotton Mechanization Conference, held Oct. 2-3-4 at Shreveport, La., and the Red River Valley Experiment Station.

The National Cotton Council sponsors this annual meeting with the cooperation of USDA, land-grant colleges in cotton states, the farm equipment industry and others.

Welcome Address

By DR. J. N. EFFERSON
Dean, College of Agriculture,
Louisiana State University,
Baton Rouge

There is a pressing need for all of us who are connected either directly or indirectly with agriculture or related businesses to discuss carefully our current problems and develop approaches to improve our efficiency and productivity. This is especially true at the present time when some of the headlines would lead one to believe that agriculture in the South is on the way out and that we should soon expect an expanding industrial economy to replace agricultural industry. This thinking is clearly fallacious but it is being repeated so often that the net effect may be deterimental to agricultural and national progress.

The increasing industrialization of the South is serving to improve the competitive advantage of agriculture rather than to divert our farm resources to non-agricultural uses. Some land is shifting to industrial uses, some labor is moving to town, and there have been changes in our farm production pattern in specific localized areas. On the whole, however, each new industry has served to stimulate farm development by: 1. providing more reliable markets for farm products close at home; and 2. supplying the industrial products needed for efficient farm production cheaper and more rapidly. The net result has been and will continue to be greater opportunities for maintaining and improving standards of living for the productive, efficient farmers.

The annual Beltwide Cotton Mechanization Conference has served as one of the major centers for the collection and distribution of facts to help maintain the needed level of efficiency and productivity for Southern agriculture. It is because of the contributions of this group that we in Louisiana are happy to have this meeting in Shreveport. Again, we thank you for being here and offer our assistance in making your visit as profitable and enjoyable as it is possible to do so.

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Means of Expanding Cotton Markets

By LAMAR FLEMING, JR.
Chairman of the Board, Anderson,
Clayton & Co., Houston, Texas

The ways I know to expand are to produce a product that people want, produce it cheaply, sell it cheap enough

to compete with alternative products, and have lots of customers who can afford to pay for it.

Cotton has desirable attributes as the material for many products. In absorbency, it is second only to linen. The strength of cotton yarn and fabrics increases with wetness. Cotton can be spun and woven or knitted to greater softness than some other fibers.

These desirable attributes do not give cotton an unchallenged monopoly in any use. The weavers, knitters, and thread makers can make most of their products out of yarn from other fibers, notably rayon and acetate. For some uses, the other fibers are entirely satisfactory. For other uses, they lack some of the desirable attributes of cotton; but some consumers will buy the products of them if they are much cheaper than the cotton products.

We must improve the quality and utility of cotton, too. Our past progress is proof that we can. Through laboratory work and study of performances of cotton in the mills, we have learned a good deal about the characteristics that make a cotton fiber perform well in the various types of yarn, give good appearance in the fabric, and absorb dyes evenly.

A very unfortunate thing is happening. The government loan differences for the lower qualities, which are tied to the past, overvalue them relative to the better qualities and materials; and the effect is to lessen the growers' concern about quality and bring about an ever-increasing surplus of the lower qualities in the government stocks, even while a severe shortage is developing in the wanted better qualities. This encourages mechanical harvesting in cases where it is not economically appropriate and production of cotton under conditions that do not give time for the fibers to mature; and the fact that the government takes these qualities over at prices above their values to mills deprives the mills of inducement to find a way to use them and makes coarse cotton fabrics too expensive for use in products like bags, in competition with paper and other materials. This is a very serious matter.

CONSUMER MARKETS — The important market to look at is the consumer market for the end-products. The textile industry has made great strides in improving the quality of the products and making them more attractive. The textile industry and the textile machinery manufacturers have advanced greatly the industry's manufacturing efficiency.

The textile people have developed fabrics whose sheer beauty and lovely designs have won a place for cotton goods in the high-style bracket which it never had before, and they have developed brand new utility qualities in utility goods.

When we look at the industrial markets for cotton products, we find a more discouraging picture. Cotton has lost the automobile tire cord market to rayon filament, which is lighter, strong enough, and cheaper, and to nylon, which is lighter and stronger. Woven fabrics generally are losing the bag market to improved paper materials of adequate strength, wet or dry. Paper towels and wood-pulp tissue handkerchiefs seem here to stay.

The key to cotton's losses to these substitutes in some cases is quality, for instance, the superior strength of nylon for tire cord; but generally it is price. The substitutes are cheaper; and they are good enough.

EXPORT PROGRAM — Recently we have been using a government sales for export program at very cheap prices. It has resulted in a remarkable increase in our exports. But it has played havoc with the American mills, who last season had to pay 25 percent more for cotton than the foreign mills were paying; it has done great violence to the consistency of U.S. foreign economic policy and world confidence in the sincerity of it; and it has left cotton utterly overpriced in its competition for the domestic market.

A decision must be made whether to continue on this course and accept declining volume—or to try to meet our competition here as well as abroad. We may not have to offer cotton as cheap as the most similar form of rayon, staple fiber, to defend our markets against further loss to it, or perhaps even to regain a part of the loss; but we will not compete effectively without narrowing the price gap. Our choice is between a business destined to shrink as a result of pricing its product out of competition and one which defends itself by realistic pricing.

This brings up the question whether cotton can be grown with profit at prices materially lower than present prices. The answer depends on costs. Cost is the subject that brought us all to this Conference—to learn more about how mechanization and the application of cultural and technological knowledge can hold costs down and raise yields, in the face of labor scarcity and high labor expense per man-hour. Use of machines and of expanding technological knowledge to expand the productivity of man-hours is the key to the success of many industrial and other enterprises around us; and the question is of the degree to which we successfully can profit by it.

We will not know what cotton can do competitively until we turn efficient cotton production loose to find its most efficient scale of operation and to price its product on the basis of cost at the efficient scale of operation.

I believe free U.S. cotton production, on lands adaptable to the economies of our generation's revolution in mechanization and technology, would compete successfully with foreign cotton productions and at least more successfully than today with the substitute materials.

We can look upon the rest of the world as competitors—or as customers. They are our competitors in production of cotton and synthetic fibers. Since 1934, they have increased their productions of cotton by about 10 million bales and of the synthetics by about as much. But their consumption has increased almost as much as their production.

FOREIGN MARKETS — Present population outside the United States is about two and one-half-billion, compared with 170 million in the United States. Thus there are about 15 potential customers abroad for one customer at home.

In the search for wider markets for our cotton, I think the emphasis must be beyond our borders.

The question will be raised whether an increase in foreign use will be reflected fully in greater foreign takings of our cotton. I do not think it will; because I believe cotton production will increase in some foreign areas peculiarly adapted to cotton production. On the other hand, I believe foreign cotton production generally is less readily expansible than U.S. cotton production; for none of the other cotton-growing countries have capital comparable with ours to finance mechanization or abundance comparable to ours of the amenities of production which most abound in an advanced economy.

Moreover, in the cotton-growing countries of dense population and limited arable acreage, local food needs will resist the transfer of land from food production to cotton production, and this resistance will increase as per capita buying power and population increase. So, I believe U.S. cotton will have the opportunity to furnish a great part of any rapid increase in the cotton requirements of foreign countries, provided it is priced realistically.

NATURAL RESOURCES — It seems to me that the greatest prospective scope of expansion of demand and buying power for cotton lies in the development of the natural resources and popular buying power of the parts of the world that have enjoyed thus far the smallest measure of economic development. To the extent that the requirements of the industries of the U.S. and other advanced economies call for more of these materials, development of the resources of them and of buying power in the so-called underdeveloped economies seems inexorable. And that development, in my opinion, will be the major measure of the scope for expansion of offtake for all cottons and for U.S. cotton.

The present fact is that development of natural resources of most countries outside the United States at a rate satisfactory to us and to the world in general, and development of their economies at a rate that will satisfy the cravings of their peoples for greater material welfare, require much more capital than their local savings can finance. It therefore depends heavily upon the availability of outside capital—just as our development a century ago depended on European capital.

Today the only copious source of mobile capital is the United States. Eventually, as the economies of these countries move toward maturity, it is to be hoped that increasing productions and earnings, together with monetary orthodoxy which increased production and earnings should make possible, will foster local liquid savings and ultimate independence from reliance on foreign capital—as occurred here as our economy matured.

FUTURE NEEDS — Our attitude must recognize the need for a more even swap with the rest of the world in exchange of goods. Internationally we are giving more goods than we are receiving. Our receipt of goods is restricted by import duties and even import quotas. Our surplus of exports is financed by government grants and loans, subsidization and gifts of agricultural exports, and the currently unrequited outflow of dollars through government grants and loans and private investment and credit.

The government grants and loans cannot continue indefinitely. Private foreign investment and credits will expand if the climate for them is favor-

able, and it cannot long be favorable without a more even exchange. But what is needed above all to balance the accounts of international outflow and inflow of goods is a more friendly attitude toward the inflow of them,—and recognition that all of us are consumers as well as producers, interested in the availability of great variety of goods at reasonable prices—that the air-borne speeds of our technological revolution and its industrial expansions are making us more and more dependent upon development of resources outside our country—and that the flowering of our domestic economy depends more upon enlargement of world economy and world trade and of our foreign trade than upon preferential advantages to segments of our economy, which can be realized only at the sacrifice of our export trade.

Shall we shrink exports to shrink imports? or expand them both? The answer is simple for the cotton grower. Fifteen-sixteenths of his potential customers are foreigners. The most expansible market for cotton goods is among peoples of low but rising popular buying power, a condition which exists more generally abroad than in this country, where the average person already earns enough to buy all the cotton goods he can use. The cotton growers' interest is in U.S. policies conducive to expansion of this great, and greatly expansible, foreign market for his cotton and its products, through rapid development of resources and economies everywhere and general expansion of trade with and between all countries, both exports and imports.

Cotton growers should have little difficulty in determining on which side of this issue they stand. They will be neglectful of their own interests and rights if they neglect to make this determination and see to it that their representatives in Washington have no doubt what their stand is. For the direction of U.S. foreign economic policy, which Congress will determine, will have more influence than any other factor upon the greatest potential expansion of markets for our cotton—the expansion where fifteen-sixteenths of the world's population live, where buying powers start lower than ours and present therefore more room for increase.

I can't refrain from bringing in another aspect of the matter. Trade contributes to the prosperity of those on both sides of it. It also contributes to more extensive contacts between peoples and greater reciprocal understanding, and sympathy, and helpfulness. This is what peace is made of—what wars are not made of.

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Role of Public Research In Achieving a Market Of 20 Million Bales

By COYT T. WILSON
Associate Director, Alabama Experiment Station, Auburn

Research does not solve problems. At best, it provides information that is useful in solving problems. Research, if it is worthy of the name, is completely objective. The solution of problems, on the other hand, involves human decisions. Research provides useful information, but the decision is almost always arbitrary to some extent.

APPLIED RESEARCH DATA — Research does not create wealth. It is the application of knowledge gained by research that creates wealth. Although this is obvious, I think that it should be mentioned in connection with a cotton research program.

For example, research might show that the efficiency of the marketing process could be increased by use of an automatic sampler at the gin, but if buyers refuse to have confidence in this sample and insist on cutting the bale each time a transaction occurs, the research has no value.

RETURNS FROM RESEARCH — The immediate returns from a research program are not always directly proportional to the amount of money invested in it. We must not conclude that by pyramiding the dollars going into cotton research we can assure ourselves of an immediate solution to all of cotton's problems. The primary emphasis should be on the training, experience, and ability of the people who are doing the research. Money is required to employ the research workers possessing the necessary training, experience, and ability. There are problems, however, that may require many years of study regardless of the amount of money spent or the number of people assigned.

In order for the cotton market to be expanded, cotton must be competitive with man-made fibers in price, quality, and promotion. In the long run, the cost of producing, harvesting, and marketing will be the predominant factors in determining the price of cotton to the mills. Research has already made possible tremendous improvements in the efficiency of producing, harvesting, and marketing cotton and further improvements are possible.

Research in plant breeding, production and harvesting practices, ginning, and packaging can continue to contribute to improvements in the quality of cotton that is delivered to the mills. Research can also contribute to the production of improved cotton products. Chemical and mechanical treatment of fibers and fabrics and improvements in the machines used in manufacturing these are dependent upon research. The role of research in expanding cotton markets is clear and the necessity for it is evident.

This research must be both private and public. Problems that are important to textile mills or other private organizations are being, and will continue to be, studied by privately financed research. These studies are a necessary part of the total program. The results of this research often yield returns to the company in the form of patent rights or increases in efficiency of operations.

If the total market is to be expanded, people must be encouraged to use more fibers, including cotton, than they are now using. Some of the ways by which this might be done are: 1. The production of novelty items. 2. The production of luxury items. This might include clothing and household furnishings. Traditionally, ladies have had larger wardrobes than men. It might be possible to develop and promote special outfits for men for special occasions. Another possibility that may or may not be feasible is the production of furniture covers and draperies or curtains that could be changed quickly and easily to enable the housewife to change the appearance of the living room for special occasions without completely redecorating. 3. The use of more textiles in standard uses. For example, we are currently using 379,000 bales of cotton per year for towels. If ways could be found to reduce cost of the towel to approximately what it would cost to have it laundered, they might be used once and discarded. Perhaps the greatest opportunities in this area are in the foreign markets. It has been estimated that by increasing per capita consumption in foreign countries two pounds per year —a pair of overalls or a bed sheet—the total market for cotton would be increased 10 million bales.

If the total market is to be increased by the production and use of novelty items, by production and use of luxury items, or by use of more textiles in standard items, research must establish the possibilities. This research may be in utilization—production of specific types of fibers, yarns, or fabrics for specific purposes or it may be in consumer motivation, economics or engineering technology. When the possibilities have been established by research, price and promotion tend to become the determining factors.

INCREASING COTTON'S MARKET SHARES. —It is estimated that synthetics supply the equivalent of 13,081,000 bales of cotton in uses that are already supplied partially by cotton.

Before cotton can capture any sizable portion of this potential market, research must point the way to 1. providing mills with cotton of improved quality; 2. more economical production, harvesting and marketing in order that cotton may compete in price; and 3. improving the quality and lowering the price of products made from cotton. It is in these areas that research can make its greatest contribution. There is sufficient background of experience to permit the scientists to move forward rapidly. Facilities and techniques are available and there are numerous problems to be studied.

BETTER COTTON QUALITY — Providing mills with cotton of improved quality requires research by many different kinds of scientists. After research has established the fiber characteristics needed for specific purposes, the geneticists and plant breeders must find suitable germ plasm to provide these characteristics and ways of incorporating this germ plasm into acceptable varieties. The plant physiologists and agronomists must delve deeper into the relationships between environment and fiber propertis in order to learn how to produce fiber of the desired quality. The agricultural engineers must continue and intensify their research on harvesting, cleaning, drying, and ginning equipment in order that gains made in quality through breeding and culture will be retained during harvesting and ginning.

Increasing the efficiency of production, harvesting, and marketing likewise requires the cooperation of scientists from many fields. Research on production is generally aimed at increasing the output per unit of input. This is accomplished by increasing yields per acre

or by decreasing the cost per acre or by a combination of both.

Before yields can be substantially increased by further research on such production practices as fertilizers, irrigation, and insect and disease control, basic research must provide a better understanding of the physiology and biochemistry of the cotton plant and its insect and fungal enemies.

Studies are needed on such problems as the factors responsible for boll set and shedding, cold resistance, salt tolerance, etc. There is also need for a better understanding of the metabolic processes associated with defoliation. The possibility of increasing yields or improving quality by use of growth regulators, should be investigated.

Problems of insect control on which more research is needed include resistance of insects to insecticides, possible use of systemics and problems connected with biological control.

The interrelationships of soil-borne plant pathogens, host-parasite relationships and genetics of plant pathogens constitute a fertile field for the basic scientist.

The interrelationships among irrigation, fertilization, soil management, and mechanization should be evaluated in terms of economics. The importance of production research cannot be emphasized too strongly. Successful competition is dependent upon an adequate supply at a reasonable price. We must look to production research for information that will make these things possible.

If we reach a 20-million-bale market for cotton, it is certain that a large percentage of this will be machine harvested. There is a continuing need for research on harvesting machinery that will not reduce the grade of the cotton and that will leave less cotton in the bolls and on the ground.

Mill operators will play an important role in the development of a 20-million-bale market for cotton. They are influenced by both price and quality in deciding whether to buy cotton or synthetic fibers. Even if cotton becomes competitive in price, ways must be found to deliver cotton to the mills that is as clean and uniform in quality as the synthetic fibers. To do this, it will be necessary for research to develop improved methods of processing and packaging at cotton gins and a better method of marketing the cotton than that currently followed. Improvements are necessary, and possible, in cleaning and drying equipment, in packaging, storing, and transporting cotton and in sampling to determine quality.

Improved Quality — Improving the quality and lowering the relative price of products made from cotton is a must if we are to achieve a 20-million-bale market. Opportunities for doing this are almost unlimited. Within recent weeks, cotton shirts of the "wash and wear" type have been placed on the market. This development is not likely to increase the amount of cotton used in men's and boy's shirts, but it probably will enable cotton to hold its present share of this market which amounts to about 577,000 bales per year.

The Southern Regional Utilization Laboratory in New Orleans has demonstrated amazing things that can be done with cotton goods. They can be made waterproof and fireproof; they can be made to dissolve in water; they can be made stiff as boards or so soft and clinging that a bandage needs no tape to hold it in place; and cotton fabrics can be tailor-made for almost any purpose. Add to these possibilities the opportunities that are available to us in technology and you have little room for doubt that cotton goods can compete in both quality and price.

R. S. STEVENSON, chairman, executive committee, Farm Equipment Institute, and president, Allis-Chalmers Manufacturing Co., Milwaukee, Wisc. (standing), opened the second session Wednesday afternoon. Others seated (l. to r.) are G. W. Giles, head, department of agricultural engineering, North Carolina State College; and Harold E. Pinches, assistant to administrator, production research, USDA, Washington.

It must be remembered, however, that these are continuing problems Successful competition with synthetic fibers will require a continuous research program on cotton. It has been reported that producers of synthetics are spending for research the equivalent of $17.00 per bale as compared to $1.35 per bale of cotton. The synthetic industries will continue to make progress and in the last analysis the group with the best and most aggressive program of research and promotion will win the larger share of the consumer's dollar. It may be some consolation, therefore, to realize that the manufacturers of synthetics cannot afford to rest on their laurels. They must maintain a continuous research program or the cotton boys will take their market

Developing New Uses for Cotton— One of the most promising opportunities for putting cotton to new uses is that of the apparel lining market. The principal requirement here is for a fabric with sufficient slipperiness and luster. These qualities can be supplied with information from research. There also appears to be prospects of using cotton for bale covers. If new covers can be developed which will compete in price with the jute bagging now used, the added protection of the cotton cover would give it enough of an advantage to justify its use. Other possible new uses include upholstery filling and padding, cigarette filters, thermal insulation, and rag content paper. Price is more important than fiber quality in these items, and cotton would have to sell for considerably less that at present in order to compete.

If the savings made possible by research are not passed on to the consumer, the goal cannot be reached. There is a need for research in the field of government policies with respect to acreage allotments and price supports, but these are difficult problems to study and evaluate. There is a growing realization, however, that this kind of research is vital to our economy and in all probability there will be developed in the near future a more aggressive research program on these questions than we have ever had before.

Research can provide information that will aid in the solution of our problems. A 20-million-bale market is dependent upon a good research program. Without such a program, the market outlet by 1965 might very well be less than 7,000,000 bales per year. It is up to us to see that we go forward instead of backward.

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Role of Farm Equipment Industry in Achieving a 20-Million-Bale Market

By R. S. STEVENSON

Chairman, executive committee, Farm Equipment Institute; and president, Allis-Chalmers, Milwaukee

My assignment is to relate farm equipment to your goal of a 20-million-bale cotton market. You are not talking about how to grow 20 million bales of cotton, but how to develop a market for 20 million bales. I think the difference is important.

I don't know what you have in mind as a price for this 20-million-bale crop, although I suspect you feel cotton has its greatest opportunities when the price is very competitive.

There is no assurance of profit in a high price, and low prices are no necessary indication of unprofitability. Actually, unit profits depend only on the difference between the selling price and the cost of production. And yet prices do affect total profits because if they are too high, they run the risk of pricing the commodity out of the market, thus cutting the volume and the total profits.

How do you become competitive, in any kind of market place? How do you make a market grow bigger?

You have to get more people to buy

DEALERS, FARMERS and GINNERS ACCLAIM . . .

Empire COTTON

EMPIRE PEDIGREED COTTON SEED IS GROWING FASTEST IN POPULARITY BECAUSE GROWERS HAVE FOUND THAT:

- It is the fastest in fruiting
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SUPERIOR PICKING QUALITIES

EMPIRE COTTON picks good by hand. EMPIRE has big, storm-proof bolls that fluff open but don't string out and fall on the ground during bad weather. EMPIRE COTTON requires from 15,000 to 40,000 fewer bolls to make a 500-pound bale than other widely adapted varieties with comparable fiber length.

We are also growers and distributors of Certified Station Georgia 101 hybrid seed corn

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Due to the amazing growth in popularity of EMPIRE Cotton Seed, supplies are somewhat short and I urge that you place your orders early this year so that you can be sure of delivery.

EMPIRE Pedigreed Cotton Seed makes a crop that makes more money for you. See your EMPIRE dealer today!

Sincerely,
Bill Estes
President

EMPIRE
PEDIGREED SEED CO.

HARALSON, GEORGIA

more of what you have to sell, through a competitive price. Just as important is quality—a better product that makes folks want it more than they want the competition.

COST OF MECHANIZATION — I can hear some of you say — "Mechanization is wonderful, but when are they going to get the price of a tractor down where more of us can buy a new one?"

That's a fair question—and the farm equipment industry has what we think is a fair answer.

Let's take a two-plow tractor, and the pull-type plow we usually sold with it back in 1939. Back then, it took 24½ bales of nine-cent cotton to pay for the outfit. Today, it takes 16½ bales of 32-cent cotton to buy the latest three-plow tractor and its mounted plow.

Here's another way to look at tractor costs—how do they compare with the wages you have to pay for hand labor?

I think most of you know that wages in the Cotton Belt are four times higher now than in 1940. If we price tractors in terms of labor, it takes 312 fewer wage days to equal the price of a tractor in the 25-horsepower class today than it did in 1940.

QUALITY HARVESTING PROGRAM — Now I would like to take just a moment to talk about power equipment and cotton quality. I suspect there are at least a few of you who think it has to be one or the other—and you can't have both.

As recently as in last year's experiments at Stoneville machine-picked fields were charged $16.20 an acre for grade loss and cotton left in the field. That's four-fifths as much as the picker charge itself.

But we in the farm equipment industry, along with the National Cotton Council and Extension Service, have invested a good deal of time and money to change this situation. The problem came to a head at your Mechanization Conference three years ago when the Quality Harvesting Program was established.

We knew even then that mechanical harvesters were capable of picking with no appreciable loss in grade—if they were properly used. Now in the Quality Harvesting Program, we are doing two things: First, alerting machinery people and picker owners to the great need for improving quality, and second, instructing operators how to run their machines correctly.

The Extension Service, assisted by the National Cotton Council, has sponsored some 90 area-wide meetings. Included were representatives from all the major manufacturers, plus cotton picker owners. In addition, farm equipment dealers have been holding a series of training schools.

Results of this educational drive can't be measured too accurately as yet. But information coming from the classers shows that the evils, at which this program was aimed, have been greatly reduced.

Besides cooperating on education in the past few years, the farm equipment industry has been spending 75 to 80 percent of its cotton machinery research money in the direction of quality harvesting.

THE PAST — In 1921 we sold a three-plow tractor that had a great, heavy cast-iron engine with 461 cubic inches of displacement but only 30 belt horsepower. At the drawbar, the company proudly claimed 20 horsepower. But the cost for each drawbar horsepower was $109.

TODAY — Today, our latest three-plow tractor has a 149 cubic inch displacement and the drawbar horsepower is 32. Even with its modern hydraulic system and eight speeds forward, today's tractor costs only $75 per drawbar horsepower compared to $109 in the 1921 model.

THE FUTURE —As for the future, the engineers of the farm equipment industry will tell you that never, in the industry's long history, has development been so rapid.

Part of the reason lies in the millions invested in modern research laboratories and in field facilities. Today, we can learn in weeks what often took years in the days of cut and try.

In research for growing and harvesting higher quality cotton, the industry is spending an estimated $1,500,000 a year.

Another factor is competition. It stimulates engineering design on one hand—and puts terrific pressure on manufacturing costs on the other. As a result, while cost of farm machinery is up 32.4 percent above the 1947-49 base used by the Bureau of Labor Statistics, the cost of labor used in producing farm tractors has gone up 82 percent and a weighted average of the type of steel used in farm tractors has gone up 69 percent.

SUMMARY — So my final suggestion regarding the cotton industry's 20-million-bale goal is simply that of using old-fashioned efficiency—in a far greater measure than ever before—to get more from every man-hour, and more from every acre, with a constantly better product.

To that end, we of the farm equipment industry pledge our continuing full support.

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Engineering Research Needs for Cotton Production

By G. W. GILES
Head, Department of Agricultural Engineering, North Carolina State College, Raleigh

Cotton production is a combination of complex interrelated practices such as spacing rows, controlling weeds and harvesting fiber. To develop and evaluate improved machines and operations either alone or in various combinations can be termed applied research and is a responsibility of management engineering and of engineering for design and manufacture. There is need for a continuing source of new knowledge from whence those who are working in the application phases can make more logical analyses, syntheses and evaluations—new theoretical knowledge for insight to operations that by-pass or eliminate the obstacles standing in the way of achieving quality control and production efficiency.

The theoretical knowledge to determine the right principle concerns the relationships of forces and materials in nature as they influence the biological material of seed, plant and cotton fiber. This is *Dynamics Applied to Cotton Production.*

I am not implying that applied engineering research is not needed. We must continually put together and evaluate new combinations of elements and operations. But all our efforts devoted to this end will result in modifications to equipment and methods that, although helpful, can only be classified as marginal. We will not be able to continue advancing at the increasing rate needed to place us in a favorable position in this age of extreme competition.

GUIDELINES FOR BASIC RESEARCH — There are three fundamental operations for the production of lint cotton . . . each one of which is a guideline area and for which knowledge in dynamics needs to be developed.

UTILIZATION AND CONTROL OF ENVIRONMENT — At planting time the cottonseed represents a potential quantity and quality of lint cotton. Our aim is to make it possible for the seed to uniformily and fully develop its potentialities. Many of the subsequent problems of grass and weed control, defoliation, harvesting and improving yield are keyed to the planting problem. The right principle here may dispose at one stroke a whole range of problems. We can only provide the *means* for the germination of all viable seed, for uniform growth of the plants to maturity, and for the desired fruiting. The means in this case is environment.

Less than *one gram* of water is needed to germinate one cottonseed, or approximately four gallons of water is needed on one acre. At planting time an acre of prepared land usually posses at least four gallons of free water. However, the mechanism for getting the water and the seed together in the right amount is another matter and is apparently not always present, and most certainly is not fully understood. Here lies a great opportunity for research . . . to make it possible for the farmer to germinate cottonseed uniformly and with certainty. This is the control agriculture needs if it is to compete with the control other industries enjoy.

The prevention or determent of the germination of weed seeds might well be improved by a better understanding of the weed seed-environment relationships. Knowledge in this area may reveal an environmental situation that within limits is both unfavorable to weed seed and favorable to cottonseed.

From the standpoint of harvesting efficiency it may be ideal to have each plant load up and mature a few bolls. The harvesting operation could then be accomplished in one trip and the date established more precisely.

CONTROL OF CHEMICAL APPLICATION— Chemicals are used to control pests, weeds, to produce defoliation, and regulate growth. The fundamental dynamic principles for applying the chemicals externally are essentially the same for these four purposes.

While more powerful and effective chemicals have been developed, application methods are inefficient from a standpoint of utilization of materials and forces and placement of the chemical. In weevil control it is estimated that only 10 to 20 percent of the materials applied are deposited on the plant surfaces in such a manner and at such locations as to be most effective. In addition to the poor efficiency of deposition there is need for a longer period of adherence, particularly when subjected to rain.

There are basically four physical forces aiding or hindering deposition of dusts or spray particles. There are *electrical*

forces, which act to attract or repel charged particles . . . *inertia forces*, which act to remove particles from a diverted air stream . . .*gravitational forces*, which tend to precipitate the particles from the air suspension . . . and *thermal forces*, which tend to move small particles down a thermal gradient.

Theoretical analysis as well as experimental results indicate tnat for many pesticides the control probability can be maintained at reduced dosages by decreasing pesticide particle size. This knowledge, however, cannot be utilized with present equipment because the principles upon which they function, that is inertia and friction charging, results in a decrease in deposition with decreased particle size. On the other hand, experimental results with charging the particles with an ionized electrical field has increased deposition by a four-to-one ratio independently of particle size within the size limits of today's dust. In addition, thermal forces are relatively unexplored, yet hold considerable promise for the small particle sizes. All of these forces and others in combination with varying particles in the form of dust, spray and fog offer possibilities.

REMOVAL OF LINT — The objective is to remove the lint in a manner that is low in cost and that will preserve its potential quality. At harvest time the developed bolls possess inherent quality characteristics and the best that the harvesting operation can accomplish is to preserve this quality.

The criteria of harvesting efficiency therefore is, the percentage of the total fibers collected, the percentage of fibers possessing the quality desired, the absence of trash in the collection, and the cost of the operation as influenced by labor energy and materials.

At harvest time the bolls are naturally separated from each other and from the leaves. They are all attached similarily by a small single stem. Logically, therefore, research should give attention to removing the cotton from this organized pattern leaving all else behind. For at no other time will we have an organized configuration of trash and cotton fiber. Once trash is incorporated in an unorganized manner the problem of separation becomes difficult and costly. It is not inconceivable that selective mechanisms presently out of our vision can be brought into focus. Many physical differences exist between the desired lint and the undesirables that need to be explored more fully. In addition the organization may be altered so that it is better adapted to new mechanism for removal. Fewer bolls per plant would give one an opportunity to organize them better for present and new principles of removal. Here is an area for joint effort of the physiologist and engineer.

We need to delve into such things as, location and dimensions of boll's link and leaves and how they can be altered, forces to remove lock from boll, boll from plant, surface properties of leaves and lint including color, aerodynamic and dieletric properties, and other physical factors as they may influence the segregation of the cotton fiber from the other plant parts. A fundamental study into the dynamics of these relationships will guide one to new concepts and principles for more effectively disassociating the open or closed boll without trash. This basic information will be the cream in the designers cup. He will then have the knowledge to put together structural materials, in a manner that will result in lighter, less costly and efficient machines; machines that are more pleasurable and exciting for the young farmer who wants to be a significant part of our rocket age.

DEVELOPMENT OF SERVO-MECHANISMS —This is an area that cuts across and may apply in many instances to the other three fundamental operations.

In the early days, preciseness of operations were accomplished by human hands. They placed the seed in the ground, they chopped weeds and they removed the cotton. Machines gradually replaced these human hands. Although we have associated preciseness with mechanization, these machines do not necessarily accomplish the job with the same degree of dexterity. Humanly controlled they put at the disposal of the operator more power and accomplished their job in many instances with brute force. Their labor reduction features offset the cost of the energy and materials and any resulting reduction in quality and quantity. I should like to raise the question, however, as to whether our next major step is in the use of servo-mechanisms that will allow a greater degree of preciseness than our present machines along with improvement in labor energy and material efficiency . . . Servo-Mechanisms that steer the power unit, that control the placing of the seed, that remove desirable lint leaving the undesirable leaves and stems. Servo-Mechanisms are being used in other industries for regulating the geometry of the material, for gaging quality and rejecting the undesirables. Why not in agriculture, on the farm, before the product even reaches the processor? The requirements of agriculture in this respect are different . . . the hours of use, the tolerances, the economics. Consequently, principles need to be investigated and applied to the specific requirement of agriculture.

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Management Approach In Engineering For Efficient Production

By HAROLD E. PINCHES
Assistant to the Administrator, Production Research, ARS-USDA, Washington

The activity which I call *management engineering* in agriculture has to do with putting together various mechanical, physical, and biological factors technically to provide more efficient systems of production.

We can justifiably approach each and every operation in the entire process of cotton production with questions like these: What goes on here? Why is this done? If this were not done, what would be the consequences? If this one change were made, what other changes should follow? Are these operations in balance? What are the bottlenecks in cotton production on this farm, or in this area? What effect does each link in the chain of production activities have on every other link, and on all of them together?

WEED AND GRASS CONTROL — It is said frequently that weed and grass control is the most important problem in cotton production, and that the lack of adequate weed and grass control is holding back more complete mechanization in several areas. In an integrated and balanced system of production much more is involved. Many other questions need to be asked, in addition to what is the nature of a given weed and what chemical or mechanical process will control it.

WHY WEEDS?—Why are there weeds? A quick answer is that the soil is infested with weed seeds which may not all be killed at any one time or by any one economically-practical operation. Many weed seeds may lie in the soil for years, not sprouting until conditions are just right. Can we, then, develop seedbed conditions favorable to cotton germination, emergence, and growth which will, at the same time, be unfavorable to most weeds? Typical seedbed preparation may be just opposite to this requirement. Our task here is to look back to the preseason handling of the soil—to tillage, planting, and placement of fertilizer— to determine the origin of the weeds, especially those which emerge simultaneously with the cotton crop. We should look to such practices as smoothing the soil for chemical spraying or flaming to see whether this soil preparation is actually inducing the emergence of more weeds. Could an equal or better job of weed control be obtained with less tillage, aiming deliberately at a rougher and coarser condition of the upper one inch of soil, and compensating with more weed-control spray?

PLANT TO A STAND — A major effort extending over many years has been to learn how to plant to a stand. Again, asking a number of analytical questions, we may start with: Why is it difficult to get any desired stand? How much of the difficulty is due to inherent variability of germination of cottonseeds? Or, is it due to lack of sufficient contact between the seeds and moist soil? If so, how may this be overcome or compensated for?

It is necessary to recognize that a poor stand may not be a problem of *germination*, but of *emergence*. Is a poor emergence due to planting too deep in order to get moisture for germination? Is poor emergence caused by crusting of the soil? Is crusting, in turn, caused by emphasis on development of a firm seedbed in an attempt to get good contact between soil and seed, but which results also in too much pulverization of all the soil in addition to that immediately around the seeds? Do present tillage methods produce or deposit fine soil at the wrong place, i.e., on the surface rather than adjacent to the seed?

Another cause of poor germination and emergence is planting in soil that is too cold.

If poor germination appears to be due to "lack of moisture," is it an absolute lack, or is it lack of adequate seed-soil contact? The considerable improvement in germination frequently obtained from use of the seed-press-wheel principle indicates that much of the failure of germination which, heretofore, has been attributed to "too little moisture" may have been, instead, inadequate seed-soil contact. So we should ask and follow up questions such as these: What more can be done to improve seed-soil contact? Can soil be sifted by the planter to put fine particles around the seed and coarse particles at the surface? May there be a possibility of seed coatings designed to gather moisture from the soil and trans-

mit it to the seed? Is it not time to be learning through basic research more about fundamental relations of cotton seeds to their immediate environment as affecting germination?

PROBLEMS OF EMERGENCE — If the problem is that of emergence due to the impedance of a crust, some pertinent questions are: What causes crusting? How can it be prevented? If crusting may not be prevented, or until practical means of preventing it are discovered, would it be possible to develop and maintain a slit or fracture plane in the crust directly over the seed? Considering precision planting and the very narrow strip of soil through which emergence of seedlings would then take place, has all that is practical been done in investigation of introduction of materials to modify the soil over the seed just long enough to insure emergence of seedlings without having to force through a crust?

The farmer goes back and forth across the field with machinery many times during the life of each and every crop. These trips across the field, covering a few rows at a time, are for purposes of cultivating the soil, applying fertilizer, controlling weeds, insects, and diseases. and for defoliation.

Many of these trips are for spraying or dusting, using equipment designed for fairly precise placement of the chemicals. Probably, there cannot be any reduction in the number of these operations—they are timed by the appearance of insects, the onslaught of disease, etc. But let us look to see whether it may be possible to *revise the mechanical operations* in such a way as to save time, save cost, carry out the operations with better timeliness.

A DIFFERENT APPROACH — Let us consider what may be the possibilities of a sharply different approach. For example, instead of planting all of the field in the conventional manner, suppose that two rows out of every 20 or 22 rows were skipped. That would leave unplanted strips through each field that could be used as roads for passage of equipment. Instead of using conventional sprayers, with booms and nozzles, operate from these roads with air-blast sprayers. Sprayers of this type are available which could blow a large volume of air carrying atomized spray 50-60 feet horizontally, thus covering 18-20 rows of cotton at each trip across the field, or 20-25 acres per hour.

Such a practice, if successful, would provide numerous benefits, including the following:

a. Greater speed of coverage than is possible with a boom-and-nozzles sprayer;

b. Greater timeliness of operation, due both to greater speed and, especially, ability to operate when a field might be too wet to go through the cultivated soil between the rows;

c. Every between-rows trip eliminated would correspondingly reduce soil compaction and root damage (in some areas this might be the greatest advantage);

d. Ability to distribute chemicals as required after the cotton gets too high for use of anything except special high-clearance equipment or aerial equipment; and the large-volume, moderate-velocity air blast might provide greater penetration of the plants for late season insect control and defoliation.

e. Ease and timeliness of application of defoliants.

SKIPPING ROWS — Aside from initial scepticism as to whether such a system would provide adequate control of insects and diseases, the average farmer might readily assume that skipping two rows for every 20 would result in approximately a 10 percent reduction in yield. However, that effect should not follow. Experiments have shown that a considerable part of the loss due to skipping rows would be made up by extra production on the rows adjacent to the skipped areas. The effects of consistently better timeliness and of less soil compaction on the planted rows are unpredictable but might, on average, result in enough increase of production to more than offset any residual loss from the skipped rows.

Then there would be direct savings, including saving in seed and fertilizer otherwise required if the skip rows were planted; savings in planting time; and considerable savings in time for every spraying operation. Even if the number of cultivations were not reduced, there would be 10 percent fewer rows to cultivate. There would be 10 percent less land to plow and fit for planting.

In some fairly level areas, land forming would permit establishment of the skip rows as permanent, slightly-elevated strips separating parallel-sided blocks of land. These elevated strips could remain untilled and become, in effect, internal field roads for passage of sprayers and certain other equipment. They should permit access to the field and carrying out of timely pest-control operations when the field itself might be too wet.

When it becomes certain that a planting of cottonseeds is well sprouted, would it be possible with air-blast sprayers to apply "pre-emergence" weed control chemicals to the entire surface of the field? If this is a somewhat startling idea, consider that chemicals are relatively new, that they have been looked upon generally as "added cost" and have, consequently, been used on a minimum basis to supplement conventional mechanical cultivation — primarily to eliminate hand hoeing of weeds in the rows. We recoginze that more selective, more effective chemicals may still need to be discovered. But it may be asked, how much more variety or volume of chemicals per acre might be justified if, thereby, weeds could be controlled sufficiently that machinery could be kept off the field for several weeks and retain soil in good tilth that much longer?

The possibility of distributing part of the fertilizers from the skip rows should be considered, also, taking advantage of two new technologies. One is the granulation of solid fertilizers, on which rapid advances have been made in fertilizer technology in the last few years. The other is the development of non-volatile forms of nitrogen solutions.

Being equipped to broadcast granular materials from the skip rows would open up possibilities of spreading seeds of winter crops before the cotton is harvested.

In the rapidly-spreading adoption of irrigation with moveable pipe, good use could be made of the skip-row roads for laying out and moving the pipes.

SUMMARY — My purpose has not been to present a package of superior production practices for use in any particular area, nor to attempt to discuss all phases of production and harvesting. Instead, I have been trying to show the need for an integrated approach to improvements in efficiency of crop production similar to the comparable activity of industrial engineers in manufacturing processes. This would not be a substitute for research by soils scientists, plant scientists, entomologists, economists, and others, but a procedure for more systematically putting together the findings of their research to discover and demonstrate the most efficient com bination of practices for each area.

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Do We Really Need Good Weed Control?

By CLAUDE L. WELCH
Director, Production and Marketing Division, National Cotton Council, Memphis

Farmers never harvest the most expensive crop they raise! This most expensive crop consists of weeds. Were it possible to account accurately for all of the costs that are involved, both direct and indirect, we would find that weeds and their control represent a much larger cost item than any other phase of cotton production.

Weeds affect two important factors which help determine the destiny of cotton. Weeds increase costs! And weeds lower the quality of cotton. This lower quality is in turn reflected in increased costs.

Because weeds increase production costs and lower quality, we have here a technical problem — one which tends to undermine and weaken the operation of our basic formula of competitive price, high quality and hard-hitting sales promotion.

MANY COSTS INCREASED—There are several obvious ways in which weeds add to the per-pound cost of producing cotton — one is decreased yields if the weeds are not controlled. Another is increased labor, materials and equipment if they are controlled.

But many costs and losses that may be properly charged against weeds go considerably beyond the direct costs of labor and materials. Other costs, usually indirect ones, are involved and should be considered — although assigning monetary values is difficult.

For instance, the heavy dependence on labor for the one production operation of weed control hampers the move toward mechanization of other production operations. Producers cannot realize the *full* potential of a new development such as the mechanical harvester when weed control methods are so undependable and still lean heavily on hand labor.

At the present time many growers face a situation in which they could eliminate a lot of labor — by shifting to six-row rigs, mechanical harvesting, and the like—only to realize that they *must* keep a large complement of labor to handle the hoeing. This simply means that our over-all level of cotton production technology is pretty much geared to this one operation.

Although it would be difficult to translate this situation into what it is contributing to our present cost structure, it's obviously important; were it not for the fact that acreage controls in recent years have tended to obscure what's

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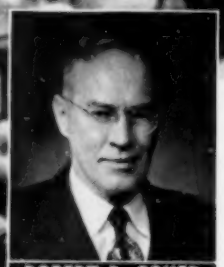

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been happening to our labor force, the pinch would undoubtedly be a lot more severe.

But if we are to look toward an expanding market, and the things that must be done if we are to share in an expanding market, this matter of breaking the weed control bottleneck takes on an additional urgency.

Raising the ceiling represented by this lower level of productiveness, of course, has a double-edged meaning when we consider cashing in on opportunities for a larger market;—

—Raising the productiveness of the "human agent" in itself would offer some needed leeway for meeting price competition—even if it didn't materially change costs.

—The other side of the picture is the fact that, if an expanding market is to mean anything to our industry, it must open the way for an expanding acreage. And, as matters now stand, this would call for proportionately more labor. Under these conditions it is almost certain that labor will not only be more *scarce*, but much more *expensive* as well. Thus, unless we can move this weed control stumbling block out of the way, we could well find ourselves in a cost situation which would not permit the prices that seem to be indicated if we are to capture and hold a larger and expanding market.

The mechanical cotton picker is undoubtedly one of the greatest developments ever achieved in the farm equipment field. Yet, as wonderful as this iron and steel miracle is — it runs into some of its stiffest competition in the form of the lowly weed. Weeds, especially vines, seriously hamper mechanical harvesting by reducing picking efficiency and causing excessive "down time."

HARVESTING HEADACHE — Weeds in the cotton field to be harvested mean weed trash in the harvested seed cotton. This results not only in downgrading of the lint and lower prices to the producer, but added headaches for the ginner and eventually for the spinner. With present cleaning equipment, neither the ginner nor the spinner can remove some forms of weed trash, such as grass and vines, without damaging fiber quality or removing spinnable fibers. But this is not the whole story. For, despite the best cleaning efforts, with these attendant losses, some of the weed material gets by and results in increased mill processing costs and lower product quality.

This problem raises other important questions. Why can't grass and similar forms of weed trash be effectively and economically removed from lint? Are we wedded to present removal methods—or are there promising possibilities for developing equipment and techniques that will remove these forms of weed trash without fiber loss or damage?

Everyone loses when the cotton farmer has a good crop of weeds. Good weed control just about means perfect weed control. And because cost and quality aspects are so important and so closely related, we must not only have good weed control, but less expensive methods as well.

In this age of technology, new breakthroughs may certainly be expected in low-cost, long-lasting control methods—and in ways to remove weed trash from lint; provided the problem receives adequate research attention.

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HAROLD T. BARR, head, department of agricultural engineering, Louisiana State University (standing) addressed the Thursday morning session. Others seated are (l. to r.) Russel Ratcliff, St. Joseph, La., farmer; Dr. Grady B. Crowe, agricultural economist, Delta Branch Experiment Station, Stoneville, Miss.; R. J. Badeaux, organizational director, Louisiana Farm Bureau, Shreveport; Cecil Collerette, chairman, production and marketing committee, National Cotton Council, Casa Grande, Ariz.; Claude Welch, National Cotton Council, Memphis; Dr. W. C. Shaw, agronomist, USDA, Beltsville, Md.; and Kenneth Messenger, plant pest control division, USDA, Beltsville, Md.

Where Do We Stand In Our Battle Against Weeds?

By H. T. BARR

Head, Department of Agricultural Engineering, Louisiana State University, Baton Rouge

Weed control continues to be a real problem, with considerable progress having been made in mechanical, chemical and flame effectiveness over the past few years.

AREA REPORTS — At Arkansas it was found that bedding and rebedding, chiseling twice and bedding, flat breaking, middle breaking, pulverizing and bedding were equally effective as weed control measures. Yield of cotton and hoe labor per acre did not show any significant difference.

In fine sandy loam soil at the Mississippi Delta Station, deep breaking of the seed bed with a moldboard plow, disking and bedding reduced the annual grass and weed population but gave an adverse effect on nutgrass stand. Extra deep seed bed preparation in part of the lower Louisiana-Mississippi Delta produced an abnormally heavy stand of indigo which required additional hours of hoe labor to eradicate.

In the Oklahoma dryland section chemicals were found more effective than mechanical weed control, but in the shallow furrow type of planting the mechanical systems gave better results.

In parts of Texas and the western sections, certain forms of knifing the top of the ridges and disking the sides of the seed bed destroyed the small weed seedlings immediately before planting and gave slightly less weed population as the cotton came up.

Mississippi's last information is that the flat press wheel did not alter the effectiveness of chemical weed control. Farmers in part of the hill section of Louisiana are discarding the broad flat press wheel in favor of a narrow or open type of press wheel.

PRE-EMERGENCE CHEMICALS — Recent work in Texas has shown the rotary hoe to materially reduce the amount of hand labor. Alabama did some work in which the rotary hoe reduced hoe labor 20 percent, while chemicals in the same test eliminated hoe labor. In a second test a combination of a rotary hoe and chemicals eliminated 80 percent of the hoe labor, with the average of their cultural treatments having no significant effect on the over-all efficiency of producing the crop. Mississippi found that rotary hoes could be used after a pre-emergence treatment with CIPC, with only a slight reduction in stand. They concluded that the rotary hoe would be satisfactory if found necessary to use.

With pre-emergence, Louisiana found that some form of rotary cultivator, working on the seed bed at the edge of the chemically treated band, would do a better cultivation than some form of a slicing or sliding tool with or without shields. Several modifications of rotary cultivators have been doing a very creditable job in controlling nutgrass crab grass, water grass and pig weed. If these units are used in tandem, the contour of the bed can easily be maintained as originally formed and little or no dirt will be thrown on the pre-emergence band.

In a recent survey covering 13 cotton growing states, in which 13,797,000 acres of cotton would be harvested, we find that only 4.68 percent of the acreage had been treated with any type of weed control chemical. The use of pre-emergence chemicals, for the most part, is confined to the central part of the Cotton Belt. The Southwest and Far West section have not found their cultural methods and chemicals now available to give any degree of weed control. The use of pre-emergence chemicals in the Southeastern States varies from 265 to 23,000 acres per state, with pre-emergence treatments on the decrease.

The majority of the work reported on has been in the lighter soil; however, Arkansas, in 1956, working on "buckshot" clay soils with a combination of pre-emergence and flame, had a reduction in hoe labor of 40 percent and a 20 percent increase in yield as compared to their conventional practices. In the same test they found that pre-emergence followed by sweeps and post-emergence followed by sweeps are com-

parable as to the hoe labor and yield, and each of these practices required significantly less labor than conventional methods.

A survey shows that the Louisiana cotton farmer, who used pre-emergence chemicals in 1957, saved $7.87 per acre in hoe labor. Taking the years 1952-56, the saving, by using pre-emergence chemicals as compared to hoe labor, has been about $4.95 per acre in Louisiana. Arkansas, Mississippi and some sections of Texas report savings by using pre-emergence, in line with those of Louisiana. The majority of soils, cultural practices and climatic conditions of the central part of the Cotton Belt are perhaps better adapted to the chemicals available today.

Here are some of the reasons given for the lack of interest in using pre-emergence chemicals. With our soils, climatic conditions and chemicals available today, getting good results only one year in five and at a cost of $5 to $7 per acre, the practice is decreasing. Chemicals are not selective enough for the Western States. Pre-emergence slows up planting and our farmrs are not going to fool with it. Most chemicals have too narrow a range of safety and will effect too few weed species. The chief drawback is the lack of equipment for applying pre-emergence chemicals. Pre-emergence chemical use is a form of insurance, but is not an economy, as hoe labor can be obtained as cheaply or cheaper in most cases.

POST-EMERGENCE CHEMICALS — The only figures I have on the value of post-emergence chemicals to the farmer show an average saving of $4.10 per acre in 1957 over hoe hands.

Seven states report that flaming has been tried on a limited scale or is not used at all. Flaming is not a once over "cure-all" weed control, but is a dependable control measure that must be combined with other cultural practices. Flame can and has been used safely and effectively for controlling weeds and grasses in cotton. Certain limitations imposed by liquid petroleum gas regulations in some states have been modified, allowing a more compact unified machine. Reports from California on the use of flame cultivation show a saving of from $5 to $50 per acre, per year for weed and grass control in cotton, with possible additional savings due to the elimination of resulting grassy cotton and a reduced price for the lint.

EDUCATIONAL NEEDS — In replies from research and extension workers, county agents and farmers there was one statement that turned up more than any others: "Farmers are not adequately educated on the possibilities, application, and uses to which chemicals can be put in controlling weeds in cotton." Several county agents in Louisiana made the statement as follows: "Every farmer who has used pre-emergence chemicals on a trial basis in this parish has adopted it as a regular practice the following year. Without pre-emergence this spring, with all the excessive rain, we would have been in serious difficulty from grass." The various research and extensive workers with the State and Federal government, and the commercial companies have each put fourth many hours of commendable work in reaching the point we are at today in grass and weed control.

Because of the many species of grasses and weeds, the different soil types and climatic conditions, the problem of getting a satisfactory chemical is indeed a complex one, not to mention the many eccentricities of the different individuals who may apply the materials. There are chemicals that can be adapted to nearly all conditions but from the foregoing statements there is ample evidence that a need exists for an intensive demonstration and instruction campaign. Further refinements in chemicals and application machinery must, of course, keep step with the times.

Mechanical methods, chemicals and flame each have their place in decreasing hand labor requirements in our cotton crop, especially where weed control accounts for the larger portion of the labor required to produce a cotton crop. In addition to mechanical methods, it would appear that we have a mighty fine tool in the form of chemical and flame weed control. It has not been employed to its fullest and some refinements are no doubt needed but will gradually be worked out. It would appear that not enough farm operators have had experience or sufficient knowledge of the research findings in order to put into effect the best chemical and flame weed control.

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Cost of Weed Control

By DR. GRADY B. CROWE,
Agricultural Economist;
DR. JOHN T. HOLSTUN,
Junior Agronomist;
O. B. WOOTEN,
Agricultural Engineer, USDA,
Stoneville, Miss.

The need for a truly effective and economical method of controlling weeds and grasses in cotton is probably the most important single technical problem that faces the cotton-producing industry today.

In many areas, cotton production is completely mechanized on a practical farm basis, for all operations except weed control. This has served to bring week-control problems into sharp focus.

EXPERIMENTAL COST STUDIES — The pre-season selection of the most economical weed-control practice for a particular field in any given year is impossible at present. However, with certain facts and certain reasonably accurate estimates a farm operator should be able to select in advance the system that will give him the greatest return over a period of several years.

It has been said that farming is changing from a way of life to a business enterprise. If this is true, some of the objections to the newer methods of weed control are no longer valid. For instance, a businessman does not reject a new labor and cost-saving method because his workers are not trained to operate the required machinery. Change in any business usually requires time and perhaps painful experience, but it can be profitable in the long run, and it may be imperative for survival.

This discussion presents the results of the study of a 16-treatment test involving the use of a pre-emergence chemical, post-emergence applications of a herbicidal oil, and flame on hill-dropped and cross-plowed cotton in all combinations.

Results of these tests should be applied only to relatively large, well-drained fields of sandy to silt loam soil in the Yazoo-Mississippi Delta, in which the primary weed problem consists of annual broadleaf weeds and annual grasses and in which early-season rainfall is expected. Both basic costs and results, however, should be of some value under other conditions, provided allowances are made for the changed conditions. The results are intended to show the ranges in relative cost and labor relationships of the different practices in seasons of low, moderate, and heavy weed infestations.

Deviations from these conditions need not negate the figures obtained, but they will modify the relative positions of the different practices. For instance, a scattered infestation of Johnsongrass or nutgrass would increase the cost and labor of each treatment to a more or less uniform degree, but heavy infestations of these weeds would require so much hand labor that control af annual weeds would be of minor importance.

All measurements of costs of machinery and application were based on performance rates of four-row equipment. Seedbed preparation, tillage, hoeing, herbicide application, insect control and other operations were done in such a way as to provide for the maximum performance of each weed-control practice.

Hoe labor costs were computed on the basis that a transient labor force of 25 active hoe-hands, one crew leader, and one hoe-filer was used for all practices. The crew leader and hoe-filer, who normally do not hoe, are paid at the regular rate for hoe-hands. For the purpose of this test, a flat rate of $12.50 was charged for hauling. Thus for hoe labor, which is quoted at 30 cents per hour, the actual cost to the farm operator is 37 cents per hour; at 35 cents per hour the cost is 43 cents per hour and at 60 cents per hour the cost is 70 cents per hour when the extra charges are added.

Cultivation and hoeing as needed will be considered as basic to each weed-control practice. Pre- and post-emergence herbicides, flame, and cross-cultivation will be considered as extra components that may be added to the basic ones. For instance, cultivation, hoeing, and a pre-emergence herbicide on hill-dropped cotton would be one-component practice, that is, one component in addition to the basic practice.

RELATIVE LABOR REQUIREMENTS—The amount of labor required to produce an acre of cotton is one of the chief factors in a sound cotton economy. Probably this will be even more true in the future. In seasons of light or moderate weed infestations, the uncombined use of either pre- or post-emergence herbicide or cross-cultivation is adequate, and all are about equally effective in reducing hoe labor.

With heavy weed infestations, labor requirements for all of the single component practices rise to unsatisfactory levels. Cross-plowing tends to be less effective than chemicals. As flame works primarily on late-season weeds, it is of more value in seasons of heavy infestations that persist into the middle and late parts of the growing season, Al-

been happening to our labor force, the pinch would undoubtedly be a lot more severe.

But if we are to look toward an expanding market, and the things that must be done if we are to share in an expanding market, this matter of breaking the weed control bottleneck takes on an additional urgency.

Raising the ceiling represented by this lower level of productiveness, of course, has a double-edged meaning when we consider cashing in on opportunities for a larger market;—

—Raising the productiveness of the "human agent" in itself would offer some needed leeway for meeting price competition—even if it didn't materially change costs.

—The other side of the picture is the fact that, if an expanding market is to mean anything to our industry, it must open the way for an expanding acreage. And, as matters now stand, this would call for proportionately more labor. Under these conditions it is almost certain that labor will not only be more *scarce*, but much more *expensive* as well. Thus, unless we can move this weed control stumbling block out of the way, we could well find ourselves in a cost situation which would not permit the prices that seem to be indicated if we are to capture and hold a larger and expanding market.

The mechanical cotton picker is undoubtedly one of the greatest developments ever achieved in the farm equipment field. Yet, as wonderful as this iron and steel miracle is — it runs into some of its stiffest competition in the form of the lowly weed. Weeds, especially vines, seriously hamper mechanical harvesting by reducing picking efficiency and causing excessive "down time."

HARVESTING HEADACHE — Weeds in the cotton field to be harvested mean weed trash in the harvested seed cotton. This results not only in downgrading of the lint and lower prices to the producer, but added headaches for the ginner and eventually for the spinner. With present cleaning equipment, neither the ginner nor the spinner can remove some forms of weed trash, such as grass and vines, without damaging fiber quality or removing spinnable fibers. But this is not the whole story. For, despite the best cleaning efforts, with these attendant losses, some of the weed material gets by and results in increased mill processing costs and lower product quality.

This problem raises other important questions. Why can't grass and similar forms of weed trash be effectively and economically removed from lint? Are we wedded to present removal methods—or are there promising possibilities for developing equipment and techniques that will remove these forms of weed trash without fiber loss or damage?

Everyone loses when the cotton farmer has a good crop of weeds. Good weed control just about means perfect weed control. And because cost and quality aspects are so important and so closely related, we must not only have good weed control, but less expensive methods as well.

In this age of technology, new breakthroughs may certainly be expected in low-cost, long-lasting control methods—and in ways to remove weed trash from lint; provided the problem receives adequate research attention.

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HAROLD T. BARR, head, department of agricultural engineering, Louisiana State University (standing) addressed the Thursday morning session. Others seated are (l. to r.) Russel Ratcliff, St. Joseph, La., farmer; Dr. Grady B. Crowe, agricultural economist, Delta Branch Experiment Station, Stoneville, Miss.; R. J. Badeaux, organizational director, Louisiana Farm Bureau, Shreveport; Cecil Collerette, chairman, production and marketing committee, National Cotton Council, Casa Grande, Ariz.; Claude Welch, National Cotton Council, Memphis; Dr. W. C. Shaw, agronomist, USDA, Beltsville, Md.; and Kenneth Messenger, plant pest control division, USDA, Beltsville, Md.

Where Do We Stand In Our Battle Against Weeds?

By H. T. BARR
Head, Department of Agricultural Engineering, Louisiana State University, Baton Rouge

Weed control continues to be a real problem, with considerable progress having been made in mechanical, chemical and flame effectiveness over the past few years.

AREA REPORTS — At Arkansas it was found that bedding and rebedding, chiseling twice and bedding, flat breaking, middle breaking, pulverizing and bedding were equally effective as weed control measures. Yield of cotton and hoe labor per acre did not show any significant difference.

In fine sandy loam soil at the Mississippi Delta Station, deep breaking of the seed bed with a moldboard plow, disking and bedding reduced the annual grass and weed population but gave an adverse effect on nutgrass stand. Extra deep seed bed preparation in part of the lower Louisiana-Mississippi Delta produced an abnormally heavy stand of indigo which required additional hours of hoe labor to eradicate.

In the Oklahoma dryland section chemicals were found more effective than mechanical weed control, but in the shallow furrow type of planting the mechanical systems gave better results.

In parts of Texas and the western sections, certain forms of knifing the top of the ridges and disking the sides of the seed bed destroyed the small weed seedlings immediately before planting and gave slightly less weed population as the cotton came up.

Mississippi's last information is that the flat press wheel did not alter the effectiveness of chemical weed control. Farmers in part of the hill section of Louisiana are discarding the broad flat press wheel in favor of a narrow or open type of press wheel.

PRE-EMERGENCE CHEMICALS — Recent work in Texas has shown the rotary hoe to materially reduce the amount of hand labor. Alabama did some work in which the rotary hoe reduced hoe labor 20 percent, while chemicals in the same test eliminated hoe labor. In a second test a combination of a rotary hoe and chemicals eliminated 80 percent of the hoe labor, with the average of their cultural treatments having no significant effect on the over-all efficiency of producing the crop. Mississippi found that rotary hoes could be used after a pre-emergence treatment with CIPC, with only a slight reduction in stand. They concluded that the rotary hoe would be satisfactory if found necessary to use.

With pre-emergence, Louisiana found that some form of rotary cultivator, working on the seed bed at the edge of the chemically treated band, would do a better cultivation than some form of a slicing or sliding tool with or without shields. Several modifications of rotary cultivators have been doing a very creditable job in controlling nutgrass crab grass, water grass and pig weed. If these units are used in tandem, the contour of the bed can easily be maintained as originally formed and little or no dirt will be thrown on the pre-emergence band.

In a recent survey covering 13 cotton growing states, in which 13,797,000 acres of cotton would be harvested, we find that only 4.68 percent of the acreage had been treated with any type of weed control chemical. The use of pre-emergence chemicals, for the most part, is confined to the central part of the Cotton Belt. The Southwest and Far West section have not found their cultural methods and chemicals now available to give any degree of weed control. The use of pre-emergence chemicals in the Southeastern States varies from 265 to 23,000 acres per state, with pre-emergence treatments on the decrease.

The majority of the work reported on has been in the lighter soil; however, Arkansas, in 1956, working on "buckshot" clay soils with a combination of pre-emergence and flame, had a reduction in hoe labor of 40 percent and a 20 percent increase in yield as compared to their conventional practices. In the same test they found that pre-emergence followed by sweeps and post-emergence followed by sweeps are com-

parable as to the hoe labor and yield, and each of these practices required significantly less labor than conventional methods.

A survey shows that the Louisiana cotton farmer, who used pre-emergence chemicals in 1957, saved $7.87 per acre in hoe labor. Taking the years 1952-56, the saving, by using pre-emergence chemicals as compared to hoe labor, has been about $4.95 per acre in Louisiana. Arkansas, Mississippi and some sections of Texas report savings by using pre-emergence, in line with those of Louisiana. The majority of soils, cultural practices and climatic conditions of the central part of the Cotton Belt are perhaps better adapted to the chemicals available today.

Here are some of the reasons given for the lack of interest in using pre-emergence chemicals. With our soils, climatic conditions and chemicals available today, getting good results only one year in five and at a cost of $5 to $7 per acre, the practice is decreasing. Chemicals are not selective enough for the Western States. Pre-emergence slows up planting and our farmrs are not going to fool with it. Most chemicals have too narrow a range of safety and will effect too few weed species. The chief drawback is the lack of equipment for applying pre-emergence chemicals. Pre-emergence chemical use is a form of insurance, but is not an economy, as hoe labor can be obtained as cheaply or cheaper in most cases.

POST-EMERGENCE CHEMICALS — The only figures I have on the value of post-emergence chemicals to the farmer show an average saving of $4.10 per acre in 1957 over hoe hands.

Seven states report that flaming has been tried on a limited scale or is not used at all. Flaming is not a once over "cure-all" weed control, but is a dependable control measure that must be combined with other cultural practices. Flame can and has been used safely and effectively for controlling weeds and grasses in cotton. Certain limitations imposed by liquid petroleum gas regulations in some states have been modified, allowing a more compact unified machine. Reports from California on the use of flame cultivation show a saving of from $5 to $50 per acre, per year for weed and grass control in cotton, with possible additional savings due to the elimination of resulting grassy cotton and a reduced price for the lint.

EDUCATIONAL NEEDS — In replies from research and extension workers, county agents and farmers there was one statement that turned up more than any others: "Farmers are not adequately educated on the possibilities, application, and uses to which chemicals can be put in controlling weeds in cotton." Several county agents in Louisiana made the statement as follows: "Every farmer who has used pre-emergence chemicals on a trial basis in this parish has adopted it as a regular practice the following year. Without pre-emergence this spring, with all the excessive rain, we would have been in serious difficulty from grass." The various research and extensive workers with the State and Federal government, and the commercial companies have each put fourth many hours of commendable work in reaching the point we are at today in grass and weed control.

Because of the many species of grasses and weeds, the different soil types and climatic conditions, the problem of getting a satisfactory chemical is indeed a complex one, not to mention the many eccentricities of the different individuals who may apply the materials. There are chemicals that can be adapted to nearly all conditions but from the foregoing statements there is ample evidence that a need exists for an intensive demonstration and instruction campaign. Further refinements in chemicals and application machinery must, of course, keep step with the times.

Mechanical methods, chemicals and flame each have their place in decreasing hand labor requirements in our cotton crop, especially where weed control accounts for the larger portion of the labor required to produce a cotton crop. In addition to mechanical methods, it would appear that we have a mighty fine tool in the form of chemical and flame weed control. It has not been employed to its fullest and some refinements are no doubt needed but will gradually be worked out. It would appear that not enough farm operators have had experience or sufficient knowledge of the research findings in order to put into effect the best chemical and flame weed control.

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Cost of Weed Control

By DR. GRADY B. CROWE,
Agricultural Economist;
DR. JOHN T. HOLSTUN,
Junior Agronomist;
O. B. WOOTEN,
Agricultural Engineer, USDA,
Stoneville, Miss.

The need for a truly effective and economical method of controlling weeds and grasses in cotton is probably the most important single technical problem that faces the cotton-producing industry today.

In many areas, cotton production is completely mechanized on a practical farm basis, for all operations except weed control. This has served to bring week-control problems into sharp focus.

EXPERIMENTAL COST STUDIES — The pre-season selection of the most economical weed-control practice for a particular field in any given year is impossible at present. However, with certain facts and certain reasonably accurate estimates a farm operator should be able to select in advance the system that will give him the greatest return over a period of several years.

It has been said that farming is changing from a way of life to a business enterprise. If this is true, some of the objections to the newer methods of weed control are no longer valid. For instance, a businessman does not reject a new labor and cost-saving method because his workers are not trained to operate the required machinery. Change in any business usually requires time and perhaps painful experience, but it can be profitable in the long run, and it may be imperative for survival.

This discussion presents the results of the study of a 16-treatment test involving the use of a pre-emergence chemical, post-emergence applications of a herbicidal oil, and flame on hill-dropped and cross-plowed cotton in all combinations.

Results of these tests should be applied only to relatively large, well-drained fields of sandy to silt loam soil in the Yazoo-Mississippi Delta, in which the primary weed problem consists of annual broadleaf weeds and annual grasses and in which early-season rainfall is expected. Both basic costs and results, however, should be of some value under other conditions, provided allowances are made for the changed conditions. The results are intended to show the ranges in relative cost and labor relationships of the different practices in seasons of low, moderate, and heavy weed infestations.

Deviations from these conditions need not negate the figures obtained, but they will modify the relative positions of the different practices. For instance, a scattered infestation of Johnsongrass or nutgrass would increase the cost and labor of each treatment to a more or less uniform degree, but heavy infestations of these weeds would require so much hand labor that control af annual weeds would be of minor importance.

All measurements of costs of machinery and application were based on performance rates of four-row equipment. Seedbed preparation, tillage, hoeing, herbicide application, insect control and other operations were done in such a way as to provide for the maximum performance of each weed-control practice.

Hoe labor costs were computed on the basis that a transient labor force of 25 active hoe-hands, one crew leader, and one hoe-filer was used for all practices. The crew leader and hoe-filer, who normally do not hoe, are paid at the regular rate for hoe-hands. For the purpose of this test, a flat rate of $12.50 was charged for hauling. Thus for hoe labor, which is quoted at 30 cents per hour, the actual cost to the farm operator is 37 cents per hour; at 35 cents per hour the cost is 43 cents per hour and at 60 cents per hour the cost is 70 cents per hour when the extra charges are added.

Cultivation and hoeing as needed will be considered as basic to each weed-control practice. Pre- and post-emergence herbicides, flame, and cross-cultivation will be considered as extra components that may be added to the basic ones. For instance, cultivation, hoeing, and a pre-emergence herbicide on hill-dropped cotton would be one-component practice, that is, one component in addition to the basic practice.

RELATIVE LABOR REQUIREMENTS—The amount of labor required to produce an acre of cotton is one of the chief factors in a sound cotton economy. Probably this will be even more true in the future. In seasons of light or moderate weed infestations, the uncombined use of either pre- or post-emergence herbicide or cross-cultivation is adequate, and all are about equally effective in reducing hoe labor.

With heavy weed infestations, labor requirements for all of the single component practices rise to unsatisfactory levels. Cross-plowing tends to be less effective than chemicals. As flame works primarily on late-season weeds, it is of more value in seasons of heavy infestations that persist into the middle and late parts of the growing season, Al-

though, in these tests, flame appears to be relatively ineffective in reducing labor, it should be remembered that in many instances, it is applied to weeds that would not be controlled otherwise. This could be expected to reduce the weed infestation in a field where flame was used several years in succession; a benefit not evaluated in this study.

Except for flame and cross-plowing, all two-component practices held requirements for hoe labor well below 20 hours per acre at the highest level of infestation encountered. At the lower infestation levels, all two-component practices held hoe labor to less than 10 hours per acre.

All three-component practices practically eliminated hoe labor in years of low or moderate infestations. They held hoe labor to the equivalent of one good hoeing, even under excessive weed infestations.

The four-component practice (pre-emergence, post-emergence, cross-plowing, and flame) was only slightly more effective than any three-component practice. As with the evaluation of flame, however, accumulative value from repeated usage over a period of several years was not evaluated.

RELATIVE COSTS — The cost of these weed-control practices is more difficult to evaluate than their effect on labor requirements. It was considered impracticable to include in these tests evaluations of hidden or indirect costs of weed control, such as reduced grade of lint because of grass, pulling away of resources needed for other crops, and hidden costs of maintaining large labor pools. But these costs should not be ignored.

At prevailing wage rates and low weed infestations, no chemical treatment, flame, or cross-cultivation was as cheap as hand-hoeing in hill-dropped cotton.

Where the weed infestation was moderate and the hoe-labor cost was computed at prevailing wage rates, all one- and two-component practices were about equal to hand hoeing. Of this group the least expensive was the single component practice of post-emergence oil on hill-dropped cotton. The added insurance, lower labor requirements, and better seasonal weed control from the three-component practices probably add enough intangible value to permit including them for consideration.

In seasons of heavy weed infestations, the choice of a weed-control practice can be critical, even at prevailing wage rates. Although the pre-emergence herbicide treatment on hill-dropped cotton, or a post-emergence oil program on either hill-dropped or cross-plowed cotton are the least expensive measures under the conditions of this test, the insurance value and lessened labor requirements of the more complicated combinations should not be ignored.

In addition, failure to use any kind of advanced weed-control method under these extreme conditions can lead to the partial or complete loss of the crop to uncontrolled weeds. In some instances, it has done so. The combined use of both pre- and post-emergence herbicides on either hill-dropped or cross-plowed cotton appears to be justified in view of the relatively small additional cost. The addition of flame to several of these practices would probably be justified if all long-range benefits and advantages of late-season weed-control could be accurately evaluated, or it could be economically used in any one- two- or three-component practices where late-season weeds were expected to be severe.

If the wage rates had been as high as 70 cents an hour, the number of possible profitable choices in the selection of weed-control practices would have been reduced sharply. Under conditions of low weed infestation all one-component practices, except hand-hoeing plus flame, would have been slightly cheaper than hand-hoeing, and only the three- or four-component practices would have been appreciably higher.

At moderate or high levels of infestation, a post-emergence oil program on cross-plowed cotton would have been the least expensive method of weed-control. Even more, though, than with lower wage rates, the added insurance value of the more complicated combinations should be given consideration. At the high level of weed infestation and at the wage rate of 70 cents per hour, cross-cultivation without the aid of chemicals drops in relative value as an effective method of weed control.

Although the two-component practice of post-emergence oil plus cross-plowing looks attractive, it should be remembered that its success depends mainly on the timeliness with which the operations can be made. The net added cost of a pre-emergence application—roughly $2.50 to $3.00 per acre—is small in comparison with the risk involved in not using it. Available cost and labor figures plus certain intangible or as-yet-measured values make it appear that at this level the most practical and economical practice would be a combination of both pre- and post-emergence herbicides. These herbicides could be applied to either hill-dropped or cross-plowed cotton with little difference in cost. The addition of flame to this combination would add a net cost of roughly $2.00 per acre. Whether or not this extra cost would be justified would depend upon the seriousness of the late-season weed infestation and its effects on both grade of cotton and reduction of the residual weed population.

The effect on hoe labor and its cost is relatively easy to visualize. Less obvious are the effects on other operations. In seasons of low or moderate weed infestations the cotton plots were cultivated five to seven times and flamed twice. In the season of heavy infestation, they were cultivated nine to 10 times, flamed five times, and the cross-plowed cotton received two applications of oil as opposed to one in the other season. In the hill-dropped cotton two applications of oil were made in all of the tests. It should be noted that in general farm practice, cultivation is often applied in excess of 10 times per year, even in light weed infestations. Other studies at the Delta Station have indicated that cultivation in excess of that needed to maintain weed control results in added costs with no benefits.

The basic costs of mechanized weed control practices represent insurance rates against excessive costs and labor for weed control. The value of the policy is thus determined partly by its cost and partly by whether or not the calamity for which it is intended occurs. As with other kinds of insurance, the more complete the protection the higher is the basic cost of the policy.

IMPLICATIONS IN NEW TECHNIQUES — It is possible that at this stage, the real benefits that accrue to the new practices in weed control do not lie in the direction of reducing costs. But they have far-reaching effects on the future of the cotton enterprise. By keeping hand-labor inputs at very low levels and allowing for a better distribution of these labor requirements throughout the production season, production risks, so far as weed control is concerned, are kept at a minimum. If requirements for hoe labor can be kept at levels low enough to be met by members of the families of year-round plantation workers, and indications are that they can be, it would no longer be necessary to maintain a labor reserve. This is the step that would shift cotton production from a labor-intensive to a labor-extensive enterprise and permit a working family to produce not from the traditional 10 acres but perhaps from 10 times that acreage. This is the direction in which cotton production must move if it is to meet successfully its strong competition.

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1958 Conference At Brownsville

The 1958 Beltwide Cotton Mechanization Conference will be held Aug. 12-14 at Brownsville, Texas. Sessions will be held at the Memorial Center, with visitors housed at nearby hotels and motels in the Lower Rio Grande Valley. Plans for the next meeting will be announced, as they are developed, by the National Cotton Council.

A Farmer's Experience With Modern Weed Control Methods

By RUSSEL Y. RATCLIFF
St. Joseph, La.

Farming, to be successful, must be a well-planned, efficient business. Agriculture is going through one of the biggest changes in history—the transition from hand labor to complete mechanization. For farming to be successful, all phases must follow these changes. This presents big problems. But, through the flexibility of farming, the complete research program of technical men in agriculture and the work of industry, many problems have been overcome. I feel sure that many more of them will be left behind with the tremendous strides that agriculture is making.

To make a crop with a minimum of hand labor I use pre-emergence chemicals, four-row cultivator, and flame cultivation. Before I plant I like to work my ground throughly and prepare a good seed bed. There are many reasons for this. As you know, a good seed bed helps obtain a good uniform stand of cotton which will "grow off" fast. I use a pre-emergence chemical, applied as I plant.

During the years I have farmed, we have had wet springs and dry, but I

have always felt that I have gotton my money's worth out of the pre-emergence chemical for the following reasons: 1. It makes no difference on what type of soil it is used, it will reduce the amount of hand hoeing needed. In wet years it is more beneficial than in dry; 2. Used in fairly clean fields that are not infested with Johnsongrass, coco, and cockle burrs, it practically eliminates hand hoeing if related practices are carried out properly; 3. It gives me the advantage of selecting my time for hoeing and for using available hoe hands. With the supply of labor for hoeing what it is today, this is a tremendous advantage; 4. It is good insurance against extended wet spells following planting; 5. It has reduced the over-all cost of making a crop. To what extent I don't know, because I have never made a crop without using it. After planting I delay cultivating my cotton just as long as I possibly can. I do this because I have never been able to cultivate without throwing some dirt up in the drill; and by the time I cultivate three times, the sprayed area of the drill is just about gone.

By delaying my first cultivation as long as possible I am able to make my third cultivation come when the effectiveness of the pre-emergence chemical has just about ended. At this stage, through the use of thrip control, preplanting application of fertilizer, and thick spacing, I hope for my cotton to be just about big enough for flaming. Sometimes it is and sometimes it is not. It is generally during this period that I have to hoe, if I am going to have to at all.

Johnsongrass generally is the factor determining this. My weed and grass control cost is in direct relationship to the amount of Johnsongrass I have in a field. Hoeing at this time works in pretty well, if the need for it is there, because I can thin my cotton some, if needed; clean out all grasses and weeds that may have escaped the pre-emergence chemical, and have a clean field to start flaming.

Also, during this period when the pre-emergence chemical is losing its effect, I "dirt" my cotton. Whether this is right or wrong I don't know, but it helps to eliminate some of the small vegetation that is coming in. After my cotton gets big enough to flame, I don't have much trouble. The only things that cause trouble, then, are bottoms where there might not be a good stand of cotton, a few weeds that may have gotten by, and Johnsongrass.

With a good thick stand of cotton and the use of a flame cultivator, I can keep my fields fairly clean and "lay by" my crop clean. A flame cultivator will lay by a crop a lot cleaner because, hoe hands will not clean out small vines and weeds in large cotton. To pick clean, desirable cotton mechanically, this is essential. I do all of my harvesting with a cotton picker. If I had to pay for hand picking my crop, I wouldn't have anything left.

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What's Ahead in Weed Control

By DR. W. C. SHAW
Agronomist, Weed Investigations Section, ARS-USDA, Beltsville

Our agricultural progress has been characterized by the discovery, development, and utilization of various forms of energy. Progress in weed control has been closely associated with the development and utilization of human, mechanical, and chemical energy. Early weed control practices were hand methods utilizing human energy. These methods were later gradually reduced and partially replaced by the hand hoe, and other hand tools. Additional progress was made in weed control as a result of the discovery of automotive power which made it possible to use improved tillage and cultivation equipment for weed control. These developments represented a gradual but steady increase in the mechanization of weed control practices and crop production.

We are entering a new era which involves the utilization of chemical energy not only to control weeds but also to control insects, diseases, and for crop protection in a wide variety of ways. Increasing emphasis on basic research will be required if we are to utilize this chemical molecular energy of the future effectively. There is increasing evidence in the field of weed control that mechanical equipment will be used more and more in the future as carriers of chemical energy which will perform the work rather than the machine in which it is applied. We must recognize that the energy of chemical molecules serves as a great reservoir out of which must come our most efficient weed control practices of the future. We are indeed entering an era of "chemical automation" in agricultural production.

Basically, our problem in weed control involves fundemental physiological differences between the crop and the weeds to be controlled. Weed research scientists are trying to develop selective chemicals to kill weeds which may be very similar physiologically to the crops they infest.

RESEARCH IN THIS FIELD — What are our current needs for a more effective weed control program in cotton? Most researchers would say: 1. an effective soil fumigant or temporary soil sterilant to be used as a pre-planting treatment, that will kill the weed seed in at least the germination zone for one crop season, or 2. an effective residual type pre-emergence herbicide which is not adversely affected by environmental and soil factors, or 3. a very effective post-emergence herbicide that enters weeds through their leaves rather than by absorption through the roots that may be easily applied with safety to cotton of all ages, and 4. simpler more efficient herbicide application equipment.

Our current weed control needs dramatically emphasize the need for expanded basic research if solutions to these problems are to be forthcoming.

The rapid developments in weed control and the lack of trained personnel have not permitted sufficient time to study the life histories of our important weeds. Basic information is critically needed on the germination, dormancy. longevity, and viability of weed seeds as influenced by various environmental factors such as light, temperature, moisture, and others. It is difficult to see how progress in the development of efficient chemical treatments can continue unless such fundamental information is available.

Too little effort is being devoted to the long term effects of herbicides on soils and the effects of various soil properties on the efficiency of herbicides. We are slowing developing information on the gross effects of soils on the efficiency of pre-emergence herbicides. However, little information is available on the factors involved in the differential absorption of herbicides and mineral elements by the roots of plants.

We are applying herbicides to the surface of soils and plants in extremely thin films. Little or no research has been conducted on the factors affecting the stability of chemicals applied to soils and plants in mono-molecular layers.

NEEDED INFORMATION — Basic information is critically needed on: 1. the absorption of herbicides by soil particles, 2. the movement and persistence of chemicals in soils, 3. the role of soil micro-organisms in relation to the use of herbicides, including which organisms do what, 4. the volatilization of herbicides from soil surfaces and the role of vapors in the activity of herbicides, 5. the role of light in the activity, persistence, and dissipation of herbicides applied to the soil, and 6. the chemical and microbial reactions that herbicides undergo in soils.

Will research workers trained primarily in the plant sciences come up with the answers? The answer, I believe, is that we will need the aid of scientists trained in the basic principles of soil physics, soil chemistry, and the other phases of soil science if these problems are to be solved. The need is dramatically illustrated by the lack of persons with this training engaged in weed research.

Too little research effort is being devoted to the basic aspects of weed resistance to herbicides and the changes in the ecological status of the weed flora as a result of weed control programs. We have evidence that resistance of weeds to herbicidal compounds may arise through the development of resistance within a species due to mass selection (and other genetical pressures) and through changes in the botanical composition of the weed flora when weeds susceptible to the herbicide being used are replaced by the more tolerant species.

Fundamental studies on the mechanism of action of herbicides in plants are critically needed. We need more basic information on the penetration, absorption, and translocation of herbicides in plants, the effects of herbicides on respiration, photosynthesis and other physiological processes in plants, the role of enzymes in the action of herbicides and the effect of various environmental factors on the selective action of herbicides. What are the sites of herbicidal action? What physiological processes are involved? What are the mechanisms of action? These questions and others will have to be answered if we are to continue progress in this field.

Additional research is needed to fully explore the potentialities of preplanting weed control techniques and practices.

AGRICULTURAL ENGINEERING — The science of agricultural engineering has

an important role to play in the future of modern weed control. The discovery of the technique of low volume, low pressure spraying was one of the most significant discoveries in the history of weed control. The average number of sprayers and dusters produced in the five-year period prior to the discovery was approximately 9,000 units per year. Now more than 90,000 sprayers and dusters are produced each year. This type equipment was used to apply herbicides on more than 35 million acres of land in 1956. Despite this remarkable progress, the use of chemical weed control methods is being retarded by the lack of efficient chemical application equipment.

There is a serious need for equipment which will control droplet size, droplet distribution, and reduce drift. New equipment designs are needed for the application of wettable powders and for compounds that are insoluble in the common carriers.

We need to examine critically our conventional methods involving the use of static pressure and nozzles for applying chemical sprays. The use of centrifugal force and spinning discs for the application of sprays, powders, and granules should be studied further with the possible view to reducing the drift hazard.

Considerable research is needed to determine the role of granular herbicidal formulations in weed control, and to develop equipment for the application of these materials. It would appear that our future progress in this field will depend on a well-balanced research approach to the numerous problems involved in weed control in cotton.

EDUCATIONAL NEEDS — There is a critical need for expanded educational and extension programs in the science of weed control. Farmers must be taught the value of crop-herbicide rotational use of herbicides, the value of mixtures of herbicides, and the multiple uses of herbicides just as they have been taught the value of crop rotation, good varieties and sound fertilizer practices. Too often farmers are approaching the problem of controlling weeds in cotton only when the weeds are present in the current cotton crop. In order to obtain a better-balanced weed control program in cotton production, farmers must be encouraged not only to use chemical weed control methods for controlling weeds in the current cotton crop, but greater emphasis must be placed on the necessity of supplementing this program by the rotational use of herbicides on tolerant crops used in the rotation.

It seems then that our future rate of progress will be largely determined by the discovery of more selective, more specific, better translocated, more efficient, better formulated, and more economical herbicides; a basic fundamental understanding of the effects of chemicals on plant growth and soils; our ingenuity in supplementing and combining chemical and cultural practices; and the development of new and more efficient weed control techniques and application equipment.

One of the most important tasks ahead is to find the personnel and the time to develop a fundamental research program out of which may come the practical applications.

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Future Application Equipment Needs For Chemicals

By KENNETH MESSENGER
In Charge, Aircraft and Special Equipment Center, Plant Pest Control Division, ARS-USDA, Beltsville

Currently, the acreage treated with agricultural chemicals by aircraft in the U.S. is equivalent to approximately one-fifth of all cultivated land. The dependence we place in such vehicles seems rather remarkable when we consider that almost all of them were designed for purposes having no relation to agriculture.

The relatively low cost of war-surplus aircraft and converted, mass-produced types has been a deterrent to the design and manufacture of specially-designed agricultural models. However, several are making their appearance, and undoubtedly within the next few years they will begin to effect a substantial replacement of less suitable types and justify their higher cost through increased safety and efficiency.

These new types will generally be capable of slower flight during operations. They will take off and land in shorter distances. They will apply either dry materials or liquids. They will carry a larger payload for a given horsepower rating.

With this improvement in aircraft, dispersal equipment must keep pace. There are now perhaps half as many different chemical-dispersal devices in aircraft as there are applicator firms.

The problem has increased in complexity with the remarkable research that has given us such an array of new agricultural chemicals, approximately 90 percent of which had never been used before 1945. This complexity applies to ground as well as aircraft equipment, but the cost of aerial tests is vastly greater.

APPLICATION EQUIPMENT — Some standardization in aircraft will permit and encourage more uniformity in dispersal equipment, and manufacturers of new agricultural aircraft are projecting their skill beyond the field of aeronautical engineering and are designing and producing application equipment suitable for the type of plane they propose to market.

Great strides have been made in progressing from dust carts to power dusters of considerable precision and capacity. Air-blast machines have replaced high-volume, high-pressure sprayers in many areas; boom sprayers have replaced dusters except for some specific purposes; and seeders have been converted to granule applicators.

Here again, the rapid appearance of new chemicals in various forms complicates the design of equipment for applying them. Some are highly corrosive, some abrasive, some dangerous to man, and some dangerous to crops near those being treated.

The boom-and-nozzle, low-pressure, low-volume sprayer has several distinct attributes. It permits the spray to be directed to any part of a plant, and even different proportions to different parts of plants. However, when we see the ends of long booms whipping fore and aft as they are moved over rough fields, we cannot help wondering how efficient some of them actually are. Certainly, under such conditions some plants receive much more spray than others, resulting in poor over-all control or a waste of material, or both.

The mist blower has the advantage of using high volumes of air and low volumes of liquid, its nozzle orfices are larger and do not clog so readily, and the dispersal pattern is ample enough to give a good overlap with a minimum of spotty deposit. Under some conditions this type of machine has effectively replaced even the row-crop boom-and-nozzle sprayer.

Much remains to be done in designing air-nozzle configurations suitable for the treatment of some crops, but from the evidence available it appears that the air-blast principle for applying sprays has a promising future.

The use of granulated pesticides will require much better equipment than is now available for its application. This is especially true of broadcast treatments where thorough and uniform coverage is required. Converted seeders have applied such materials with reasonable success, but often the uniformity of deposit is adversely affected by slight winds. Moreover, along hillsides the distribution may not be good. Here again, a single- or multiple-nozzle air-blast machine may prove to be a good solution.

CORROSION AND ABRASION — The current complexity of chemicals accentuates the problem of corrosion and abrasion. A five-year cooperative study of this subject reveals that tanks are the most common source of compaint. Accumulations of rust and scale are abrasive and tend to plug screens and nozzles.

Tanks made of stainless steel or polyester plastic and fiber glass are resistant to a wide variety of chemicals, but tanks of some other materials give fairly satisfactory service if they are cleaned frequently and kept dry when not in use. Metal tanks coated with plastic and fiber glass have also proved durable and trouble-free. Also coating of heat-cured phenolic and epoxy resin have shown good resistance to pesticides and solvents.

The pump, the heart of the spray system, has been the subject of much research. Pumps must handle solutions, emulsions, and abrasive suspensions, they must be reasonably impervious to the action of solvents and other chemicals, and their capacity must range from less than one gallon per minute for some row-crop sprayers to more than 200 gallons for large aircraft. In general, where high pressures are not required, the centrifugal pump has proved the most satisfactory. It has a wide capacity range and is fairly resistant to abrasives.

Other types of pumps that offer some advantages are the diaphragm pump for abrasive suspensions and the hose pump for liquid fertilizers and soil fumigants where low pressures and low discharge rates are suitable.

The most troublesome valve is the check valve.

In the use of herbicides and in all aircraft work, leaky nozzles can result in many difficulties. With aircraft in particular, the dribbling of nozzles during turn-arounds or ferrying can destroy crops or wildlife or build up harmful residues. Some check valves on the market operate well with materials free of foreign matter. Leakage can be reduced by the introduction of small bleed lines between the boom and tank, bypassing

WATSON
STORMPROOF COTTON

(STATE REGISTERED)

The Most Sensational of Stripper-type Cottons!

THIS

Note how CLEAN the machine stripper leaves the field planted with WATSON STORMPROOF COTTON. Truly the modern cotton!

NOT THIS

This is a field planted with ordinary cotton. Note how much cotton has been left in the field and on the plant after machine stripper has been used.

PERFORMANCE

Bright in color . . . coarse in fiber . . . blight resistant . . . WATSON STORMPROOF COTTON is proving to be the ideal cotton. Bred especially for machine stripping (but also easy to hand snap) this cotton has excellent yield, stays in the burr, good lint per cent and top grade. Actual production experience proves it a real money maker and a boon to cotton farmers throughout the Southwest. Early maturing, prolific, high quality cotton with light foliage and, of course, bred up to the high standard of all WATSON varieties.

COTTON SEED WATSON HYBRID CORN

FERRIS WATSON SEED COMPANY

GARLAND (Dallas County), TEXAS

the pump, to relieve pressure in the boom when the main valve is shut off. However, the best system employs a positive shutoff valve at each nozzle.

The deterioriation of hoses has been troublesome in the past, but the use of synthetic rubber compounds such as Buna N has greatly reduced problems resulting from swelling, softening, and blistering.

In the design and orientation of booms, improvement continues to be made. With ground equipment the so-called dry boom is finding favor in some areas. In this system the liquid is carried in flexible tubing attached to a structural boom. Among other things, this simplifies rearrangement of nozzles and permits diversity in the design of the boom itself. In aircraft, the added considerations are air resistance or drag, greatly increased flow rate, and the effect of aircraft configurations on the deposit pattern. Booms located directly behind the wing's trailing edge have been found to reduce drag and are beginning to be used commercially. Long booms introduce spray into the wing-tip vortices. The resulting swirl of the spray may increase swath widths, but it may also produce a very uneven deposit or uncontrolled spray drift.

Last among the equipment components comes the nozzle. The hollow cone offers some advantages over the flat spray nozzle. It produces a slightly more uniform atomization and wears less when used with abrasive liquids. Erosions, causing overdosage and pressure drop, can be retarded significantly by the use of hardened stainless steel, ceramics, and tungsten carbide. The use of such materials may not always be warranted, but for applying wettable-powder suspensions and sprays containing dirty water they have distinct advantages.

We need a continuing study of methods, requiring the cooperation of engineering and biology, and closer attention must be given to the subject of residues. Cotton growers may not be so concerned as growers of fruit, vegetables, and livestock, but may nevertheless be growing crops with low residue tolerances adjacent to cotton fields or may be involved in the risk of post-harvest grazing or the feeding of gin trash.

Equipment with a high standard of precision will be required to an increasing degree in the future. Engineers can design such equipment and they can design machines that will perform almost any function. However, in agricultural mechanics there are economic limitations and also limitations in trained manpower. Furthermore, applicator machines and methods must be relatively simple—for the number of persons who will adopt them is likely to vary inversely with their complexity.

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Cotton's Promotion Machinery

By ED LIPSCOMB

Director, Sales Promotion and Public Relations, National Cotton Council, Memphis

I want to divide my comments into three parts: (1) what sales promotion essentially is; (2) the basic policies we follow; (3) typical examples from the program itself.

In sales promotion *we undertake to multiply cotton's sales impressions through print, picture, and sound.* For example, we have what is for us a rather substantial campaign in behalf of cotton-cushioned mattresses, a product we want people to buy instead of foam rubber.

Instead of using our money to employ a relatively few personal salesmen, we photograph our product, put into type beneath our picture the basic message our personal salesmen would use, publish it as an advertisement in a national magazine, and thereby send our story simultaneously into five million American homes.

Sales promotion means using the techniques and media of mass persuasion to sell our cotton products. It is *the multiplication of our sales impressions through print, picture, and sound.*

ED LIPSCOMB, director of sales promotion, National Cotton Council, Memphis, is shown addressing the banquet Thursday night.

PROMOTION EFFORTS — From an industry standpoint, there is an amazing degree of similarity between the basic policies which guide our promotion effort and those which must guide a research program.

The four fundamental policies we follow are:

No. 1—We concentrate on those *markets* where promotional effort appears likely to yield the greatest response. If you will substitute the word "problems" for "markets", I believe you will find this to be as good a guide for research as for promotion.

In following such a policy, we freely admit that promotion is not the cure for all market ills. It is at its best in those markets where individual taste and preference have important influence on sales —dress, shirts, drapes, floor coverings, and other areas where appearance, comfort, convenience, and related personal considerations are involved.

It is our first responsibility to select the markets which are likely to be the most responsive.

No. 2—We concentrate on those *techniques* which we believe will yield the most impact per dollar of expense. Whether applied to promotion or to research, there is no extraordinary virtue in such a policy. It is everyday common sense.

No. 3—We stress the importance of obtaining *cooperation*, financial and otherwise, from groups especially interested in particular cotton products. Here again is a policy not only adaptable to the industry's research program, but already put into active practice by it. In the case of promotion, we have emphasized it so strongly that this year there are five Council campaigns into which cooperating sponsors are putting more than four times as much as we are able to allocate.

No. 4—We seek to take full advantage of the *public welfare* aspects of the cotton industry and its products. In research, the public welfare factor is reflected in the fact that approximately 50 percent of the total being spent on cotton research in all forms by all agencies is provided from public funds by governmental appropriation.

In promotion, we seek to take advantage of the same factor in our work with the various media of public communication. The cotton publicity which appeared in national magazines, newspapers, and on television this year is a reflection, in part at least, of the public welfare significance of cotton as a basic agricultural commodity, and the willingness of communications media to cooperate with it.

ULTIMATE GOALS — Thus it is that you research and development people are actually brothers, under the skin, of us promotion people. In ultimate goals, we are identical. In the fundamental policies and approaches which can make our work most effictive, we are amazingly similar. It is when we get into the field of program planning and operation that we start inhabiting different worlds.

Your world has always been mysterious to me, and I have accorded it the respect and admiration I normally feel for something good which is over my head or beyond my knowledge and experience.

It is entirely possible that the world of promotion has likewise appeared strange to you.

COUNCIL PROGRAM — In our Council program we have about 22 different pieces of cotton promotion machinery —campaigns, we call them. The first one I want to take apart for you is one you have seen around the place for some 19 years. Outside, it is the brightest, most eye-catching, fully streamlined piece of equipment we have, yet a deceptively inexpensive one. It is our Maid of Cotton program.

MAID OF COTTON — Most people think of the Maid of Cotton only in terms of glamour and gaiety.

That is true, but it deals only with the paint and the side plates on the outside of the machine. Inside is one of the most rugged pieces of promotion equipment I know anything about.

What are we trying to do here? Two things: sell women's apparel; do a public relations job among some groups who are highly important to all cotton products.

How does the Maid of Cotton help us do those things?

(1) She provides an opportunity for us to work intimately with the nation's foremost fashion designers under highly favorable circumstances.

(2) The Maid provides heavy and

direct sales impact through the nation's big name retail stores.

(3) The Maid makes an important contribution to the industry's public and governmental relations job in Washington.

(4) In her foreign travels the Maid and her party have been of substantial assistance in spreading the cotton promotion idea into countries which are our export customers. In Spain it was a Maid of Cotton visit which brought the spinners together for their first industrywide promotion project.

(5) A fifth accomplishment is the success of the Maid of Cotton program in multiplying Council funds. Detailed tabulation shows that the total spent by all who participate in, or contribute to, the program in a typical year comes to $481,000. We look on such cooperation as especially gratifying since the Council's annual cash budget for the program is $32,000.

CANVAS AWNING CAMPAIGN — Now let us look at a wholly different type of promotion machine. It is our canvas awning campaign.

Here we are selling the benefits our product brings. Our job is to get across the story that our product reduces room temperatures 8 to 15 degrees in summer —makes air conditioners work better and last longer, etc.

This is a campaign which must reach directly to the individual home owner. The message is of a type which calls for controlled advertising which means cash. Funds available through the Council, however, are insufficient for that approach. Awning manufacturers are small local operators so that money-raising on a substantial scale is impractical.

The answer was found in a small group of converters who finish awning fabrics for the entire trade. This group organized and incorporated a Canvas Awning Institute with Council employees as the unpaid staff.

A campaign was organized around 15 network television commercials reaching six million persons. From dealer response, we know that they sold a lot of awnings.

"THE LAST THREE FEET" — The third piece of machinery was planned in recognition of two important facts: (1) in the case of over 80 percent of the total volume of cotton's markets, the really vital sale is not made until the finished product moves across the counter of a retail store— "Across the Last Three Feet," we call it; (2) the only face-to-face personal sales representative the cotton industry has is the clerk behind the retail counter. Unless that clerk knows cotton's virtues and is enthusiastic about them, our fiber is not going to get the personal sales emphasis it deserves.

While there are well over a million sales people in the nation's department stores and speciality shops, the largest and most influential stores are in about 100 metropolitan markets which account for more than 56 percent of the nation's total retail business.

A specially trained cotton representative holds classes for sales personnel under the sponsorship of store management. He shows a color movie on cotton's selling points, explains new developments in cotton fabrics and finishes, answers questions, and passes out sales training booklets. Later he visits personally with sales people in those departments where cotton is most involved, amplifying his classroom comments to cover particular products and situations.

This campaign is one in which the major multiplication of our effort comes through the influence and activity of those toward whom our efforts are directed.

PROMOTION MACHINES' EFFECTS — What do the three promotion machines I have described, and the others I referred to, actually contribute to our mutual goal of getting as many cotton products as possible into use by as many consumers as possible? What have we to indicate that with adequate financing they can play an important part in achieving the 20-million-bale consumption level discussed here on yesterday?

DOMESTIC FRONT — On the domestic front, the gains accomplished in cotton's promotable markets have substantially offset the staggering losses we have sustained in industrial areas where arithmetical calculations determine our competitive position.

In four of our largest industrial markets, in the last five years, we have lost 62 percent of our former volume. In the same period, we have gained 65 percent in eight typical markets responsive to promotion. In some cases the gains have been especially gratifying—54 percent in women's street dresses, 140 percent in women's sportswear, 145 percent in men's sport shirts.

FOREIGN TREND — On the foreign front, the effectiveness of our domestic promotion machinery has brought about what history may reveal to be the most significant development in world cotton consumption in the last hundred years.

As late as 1952, there was not one country anywhere on earth, outside our own, which had a program of any kind to promote the sale of cotton products. Today, 14 countries are operating such programs—programs which are based directly on our own, and which are conducted in close cooperation with us. Four additional countries have plans in active preparation.

Textile groups in the 14 operating countries, on the average, this year will spend more of their own funds on cotton promotion, in proportion to population, than will our own cotton industry.

When we put together the facts that average world consumption of cotton per capita is about one fourth our own, that even a two-pound increase would require an additional 10 million bales per year, and that today the owners of nearly three-fourths of the free world's spindles are actively supporting campaigns to increase the sale of our fiber, we have the basis for realistic optimism concerning cotton's future.

When we add the final fact that these are things, domestic and foreign, which the U.S. cotton industry has accomplished on a promotion budget roughly one-half of one percent as large as that of our foremost manufacturer of automobiles, we have some indication at least of the role which modern selling can play in the achievement of the goals which have been discussed at this meeting.

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Land Preparation for Efficient Cotton Production

By T. W. EDMINSTER
Assistant Head, Eastern Soil and Water Management Section, ARS-USDA, Beltsville

The phrase "site preparation" is short and simple—it consists of but two well-known words found in nearly everyone's vocabulary. The phrase is so simple, however, that it may actually be confusing, because it has so many different meanings for different people.

We may ask ourselves the question, "What is one basic key to an efficient cotton production program?" Is it not "site preparation"—the preparation of land—in all three dimensions—to provide a site designed for effective and efficient use of man power, horse power, and plant growth power?

Why should we expect to achieve precision cottonseed planting, with resultant uniform stands, on fields so irregular that four-row planters will run at four distinctly different depths? Why should we expect good drainage or unifrom irrigation distribution on fields covered with many depressions, dead furrows, or other machining scars?

The masters of this nation's highly efficient industrial production program have relied on good "site preparation" as the first basic step in the production program.

Should we not adapt good "site preparation" as a key step towards efficient cotton production under a mechanized production program?

The following speakers will explore the progress being made in applying three-dimensional "site preparation" to implement an efficient cotton production program.

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Problems, Causes and Remedies of Soil Compaction

By DR. A. W. COOPER
Assistant Director, National Tillage Machinery Laboratory Section, USDA, Auburn, Ala.

If the soil is too compact, the crop yield will be limited. Soils vary widely in their susceptibility to damaging compaction. Plants also vary in their tolerance to compact soil. It is extremely difficult to determine limits of tolerance to compaction by measurements of bulk density, pore space, soil strength, or other physical properties. Soil and plant scientists and agricultural engineers have found that some reasons for the reduction of plant growth due to compacted soil layers are reduced water infiltration, reduced available water holding capacity of the soil, mechanical impedance of plant growth, sometimes actual restriction of root growth from a soil mass, and the reduction of the rate of gas movement in the soil.

CAUSES —All dense soils are not due to compaction by equipment. Many compact soils, such as clay pans, are genetic formations. The rear tires of tractors are good compaction devices. The two-

wheel drive tractor is designed so that when pulling a load most of the weight of the tractor is on the rear wheels. Then we put one wheel of the tractor in the furrow when plowing, which tilts the tractor slightly so that the furrow wheel carries more than half of the load of the two rear wheels. This high pressure is applied to a surface below which we do not normallly plow. The compaction caused by this pressure will depend upon the moisture content, the initial bulk density, and the physical properties of the soil. In addition to the straight compressive force due to the weight of the tractor, the tire must slip some in order to pull a load. This slipping usually causes a re-arrangement of soil particles into a more compact pattern.

Tracks have the advantages of operating on the surface of the land and at a lower unit pressure applied to the soil but have the disadvantage that they apply the force to the soil over a longer period of time, and the force is applied by a vibrating load.

Even our tillage tools, designed to loosen the soil, apply compressive forces directly to the soil in order to produce tension and shearing forces to that part of the soil not in contact with the tool.

REMEDIES — The best practice to minimize soil compaction is to minimize traffic and tillage and to perform all operations when the soil is as dry as practical. Shattering the compact zone when the soil is dry may substantially improve the soil's physical properties, thus increasing yields. Also, proper cropping practices and vertical mulch have been shown to help. A possibility for reducing compaction and obtaining more traction for a given weight wheel tractor is the use of four-wheel drive.

In California a half bale of cotton was produced on soil with a definite traffic pan and two bales on the same soil which had been chiseled 20 inches deep. In Mississippi increases in seed cotton yield of 464 to 873 pounds per acre were obtained by shattering hard pans with various subsoiling implements over the middle buster check. At the Delta Station they have obtained increased yields as high as 1,600 pounds of seed cotton per acre. Yields from a 40-inch interval of subsoiling were significantly higher than an 80-inch spacing. Workers also found the beneficial effect of subsoiling carried over to the second and third years. Research results suggest that in years of near adequate rainfall the omission of deep tillage for a year may not adversely affect yields, but when drouth conditions prevail, annual treatments will produce higher yields. Clay soils are less susceptible to compaction than the fine sandy loams.

At the National Tillage Machinery Laboratory we have developed a pressure cell to measure the stress distribution in soils under tires and tracks, as well as stress due to other forces applied to the soil. The amount of compaction in a given soil at a given moisture is directly related to the stress in the soil. A track shoe dynamometer has been developed to measure the vertical and horizontal components of force applied to the soil by an individual track shoe. Continuously recorded measurements can now be made of the force applied to the soil and the stress distribution in the soil resulting from the force. We are also measuring the change in bulk density with the known forces. We plan to obtain similar information under tires on several soil types.

We have tested the relative draft of several shapes of subsurface tillage tools in the soil by developing a tool bar dynamometer to measure the draft. We are making soil physical measurements before and after tillage to determine the best soil break-up for the least amount of power. Studies of the shape of a subsoiler standard have shown that a curved shank requires 10 to 25 percent less power than a straight standard and the soil break-up is just a good. Several studies are being made to determine the best soil physical measurements to characterize the soil before and after the tillage operations or before and after traffic over the field surface.

Preliminary calculations and tests indicate that deep compaction is not a function of unit pressure applied to the soil alone but is a function of the unit pressure and the area over which the load is applied.

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DR. A. W. COOPER, assistant director, National Tillage Machinery Laboratory, Auburn, Ala., (standing) addressed the Friday morning session. Other speakers seated (l. to r.) are T. E. Corley, agricultural engineer, Alabama Polytechnic Institute; J. W. Kirkpatrick, cotton producer, Twist, Ark.; T. W. Edminster, assistant head, Eastern soil and water management section, USDA, Beltsville, Md.; Dr. Charles Upp, director, Louisiana Agricultural Experiment Station, Baton Rouge; Irwin L. Saveson, drainage engineer, Louisiana State University.

Land Forming in Alluvial Areas

By IRWIN L. SAVESON
Project Administrator, ARS-USDA Soil and Water Conservation Research Division, LSU, Baton Rouge

The practice of forming land was developed in the arid section of the United States to assist in the application of irrigation water. This practice is moving to the humid section of the United States to assist both in the application of supplementary irrigation water and the removal of excess rainfall by improving the surface drainage.

Agricultural workers have of necessity used the principles and techniques developed in the arid section of the United States in forming and smoothing land but have found it necessary to modify them.

TIME FOR FORMING THE LAND — In comparison with the arid section, the idle period for row crop land in Arkansas, Louisiana and Mississippi is of short duration and is also the wet season of the year. Experience has shown that it is desirable to leave the land out of crop for a season, doing the forming during dry periods after adequate disposal of crop residues.

PREPARATION FOR FORMING THE LAND —The Delta Branch Station at Stoneville, Miss., reports an increased cost of $20 per acre for forming land under trashy conditions. Crop residues are disposed of by plowing them under, allowing sufficient time for decomposition before starting the forming operations. In the meantime, volunteer vegetation is kept under control by disking. Forming operations in disposing of trash and controlling vegetation leave the earth in a fluffy condition. The fluffy soil conditions lessen efficiency in many instances, as earth-moving equipment operates better on a firm soil than on a loosened soil. The area should be floated or dragged to remove the rows and implement scars and to firm the area as much as possible.

Costs of moving the earth at seven work locations in Louisiana and Mississippi range from 22 to 30 cents per cubic yard with the higher costs on areas having light cuts and fills. The cost ranges from $55 to $120 per acre, most of it averaging $60 to $75 per acre.

Most farmers are subsoiling the areas after forming to release the compaction of the earth-moving machines. This is desirable since tests in Louisiana show that land forming equipment, especially land levelers, compact the soil approximately six pounds per cubic foot. A heavy field cultivator with flexible chisel shanks is a very good tool for this operation because it blends the original soil with the fill material.

TILLAGE PRACTICES — Some farmers have taken steps to gear their tillage prractices to formed land. They have purchased two-way plows in order to maintain the generally formed slope and are floating the fields before each planting. Other farmers are disking and row-breaking; however, a number of them have not given this phase much consideration and are tilling their fields in the original conventional manner, which will eventually lessen the effectiveness of the forming work.

BENEFITS — Most farmers accept the fact that good drainage is essential in securing an adequate stand of cotton and, generally, the poor stands on farms

reflect inadequate drainage. This year, which has been very wet, visual observations in Louisiana and Mississippi show a good stand of cotton and a more uniform growth, even on "buckshot" land, where precision land forming work has been done. Farmers enthusiastically report that more efficient machinery operations on formed land have been effected, especially during periods after heavy rains. The fields dry evenly. No definite study has been made to evaluate the drainage effects of land forming on cotton. If there had been, trying to evaluate the effects would have been difficult since the number of ponded areas vary considerably. In most of these areas it is a matter of adequate drainage or the crop perishes.

It has been pointed out that cotton field machines, especially pickers, work more efficiently in fields having a uniform crop. Tests at Newellton, La., in a field having a moderate ridge and slough conditions showed an evening of yields on the entire field after forming.

In periods of dry weather where farmers have irrigated fields that have been formed, an increase of one-half to one bale of cotton per acre is reported.

SUMMARY AND COMMENTS — In reviewing the land forming work we must realize that in a short period of time we have moved a very exacting, entirely new, agricultural practice to the humid section of the United States. Prior to the last two or three years, no great amount of land forming work was done in the cotton section of the alluvial areas. There was little information available on applying the practice to the humid area. Prior land forming work had been done for rice and sugar cane, both specialized crops, which use specialized field arrangements. Research work had been primarily confined to sugar cane land.

Agricultural workers, farmers, engineers and contractors are now going through a period of "growing pains" with the practice. They have done very well, considering their limited experience and available information. This is substantiated by the amount of land forming work that has been done in a short period of time and the farmers' acceptance of the practice.

Land forming is an agricultural practice requiring precision work to function 100 percent. The weakness of the work shows up during periods of excessive rainfall. I refer primarily to insufficient fills which impound water during wet periods, taking their toll in crop production. The deeper fills settle and it may take several reworkings to bring them up to grade, perhaps two or three years. Some technicians working in the field state that the fills under 0.5 feet do not give any trouble.

Many theories have been expounded on the crop retardation in the fill areas, such as compaction, but my opinion is that if we obtain an adequate forming job this retardation will be kept to a minimum, provided the area is scarified or ripped both before and after filling.

The amount of earth to specify for the fill areas to meet the settling problem should gradually be solved as more experience is gained in land forming operations.

Many technical workers have been checking the work in accordance with the specifications of 0.1-foot tolerance set up by various agricultural agencies, overlooking the fact that irrespective of tolerances allowed, the areas should be checked to see if they drain.

There is an absence of large land levelers to correct the discrepancies left by the rough forming work. Since a 0.1-foot tolerance is usually allowed on the rough land forming work, the short land levelers are not bringing the areas to grade. As land levelers are new in the humid areas, farmers are not familiar with their use and limitations and many still think of them as earth-moving tools instead of finishing tools. Furthermore, they are not familiar with the adjustments of the automatic type levelers. Equipment dealers have an obligation to familiarize farmers on the use, adjustment and limitations of the equipment they sell, especially since land levelers are new in the area.

The lack of skilled operators is a problem in executing the work, but this problem should be lessened as more experience is obtained.

Land forming assists in surface drainage of cotton land, a prerequisite for good stands and even growth of cotton during periods of excess rainfall.

Land forming hastens the removal of excess rainfall, which will require technicians to give consideration to increasing field and outlet drainage work.

When supplementary irrigation has been required in periods of moisture stress, farmers are reporting an increase of one-half to one bale of cotton per acre. Reduced cultivation costs have also been reported on acres that have been formed. Additional information is needed to carry on the work, as follows:

1. In the ridge and slough areas there is especially need for information concerning the maximum row length and grade that can be used with the minimum amount of erosion.

2. The maximum amount of sidefall that can be allowed in a graded area.

3. Information on faster runoff from formed land for adequate drainage design.

4. More definite information on the economical limits of land forming as related to benefits and the time for amortizing the costs.

The land forming work in the alluvial areas has made considerable progress in the last two or three years and all indications are that continued application of the practice will develop many refinements. As farmers, agricultural workers, engineers, and contractors obtain more experience with the practice, we can expect to see more precision in the work. With the vast farmers' acceptance of the practice, land forming should make a substantial contribution to the agriculture of the alluvial sections in facilitating drainage, irrigation, and definitely aid mechanized cotton production.

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A Farmer's Experience With Land Forming In Alluvial Areas

By J. W. KIRKPATRICK
J. F. Twist Plantation,
Twist, Ark.

We became interested in land leveling about four years ago for better irrigation, which was a mistake. We should have been interested in it for better drainage.

There are a lot of ways to irrigate, but here's how we are doing it at the Twist Plantation. Our first interest now is drainage and not irrigation. We hired an engineer and worked out a plan to level 400 acres to a fall of approximately one-tenth of a foot to the 100-feet with no side slope. Wherever possible we have a zero side slope. We planned to have 1,000 acres of this type irrigated cotton in 1958 on soil types ranging from silt and sandy loam to heavy clay.

OUR MISTAKE — In leveling this land to a tenth grade, we have had to move from 400 to 600 yards of dirt per acre at a cost of approximately 15 cents a yard. That is from $60 to $90 per acre. To move this dirt we used farm tractors pulling eight-yard elevating scrapers. This method of dirt moving has proven very satisfactory to us. After completing a basic dirt moving, we used land levelers to plane it and plows to chisel it to loosen up the compaction. There may be some compaction yield problems for the first year after leveling. I was wrong in taking a position of a tenth fall; that is too flat.

After moving the dirt there's a whole lot more to do besides getting the water to the crop. You have to finish it, to put in paths and turn rows and things. We had $100 an acre invested, but we got it too flat for proper drainage. We have abandoned the tenth idea and we went to a minimum of two-tenths on our light soil and two to four-tenths per 100-feet of fall on our heavy soil.

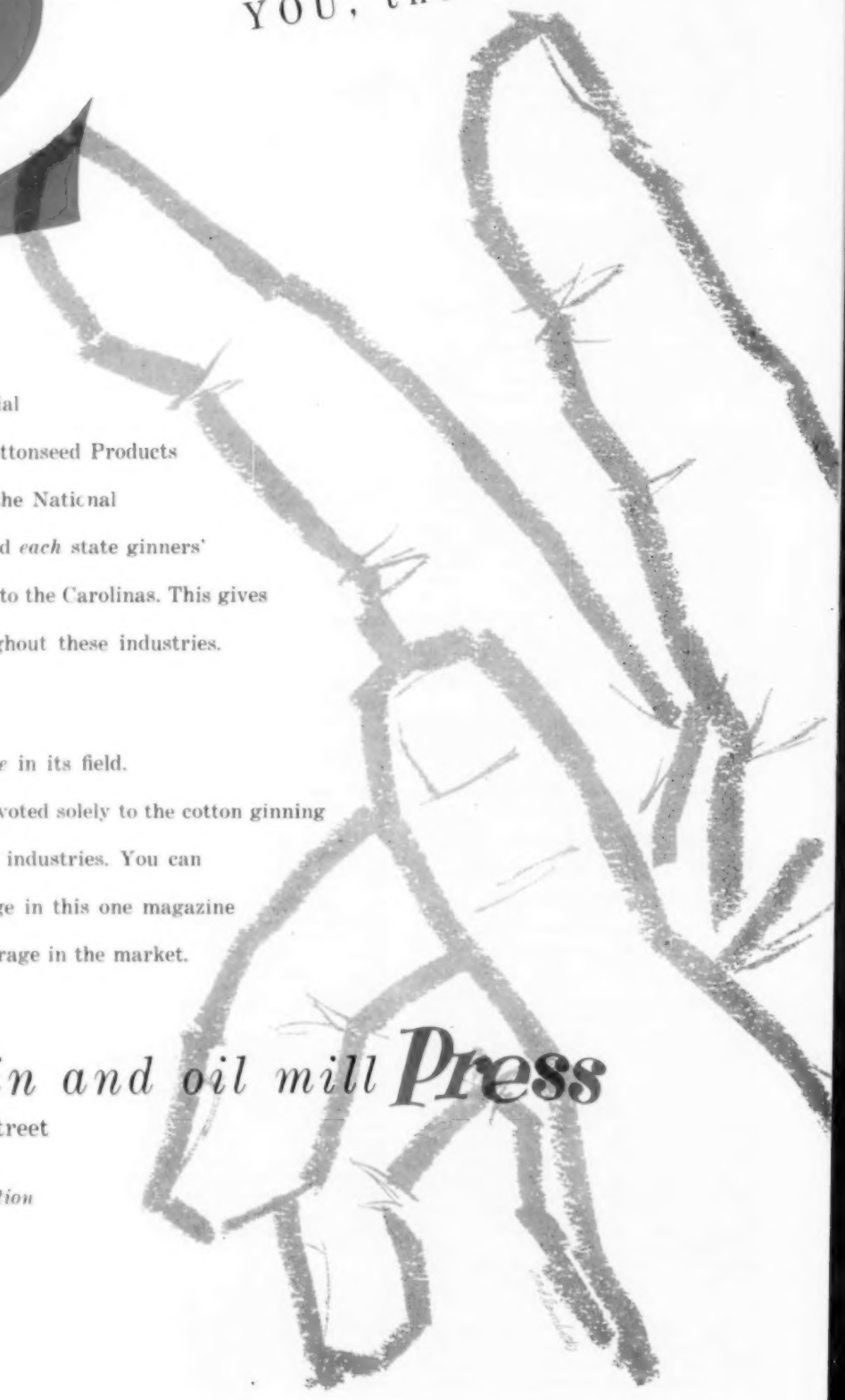
We used several pieces of our own equipment to clean up after the contractors.

IMPORTANCE OF DRAINAGE — Prior to the spring of 1957 we had been doing all of our planning for land forming for the purpose of irrigation, with drainage as a secondary benefit. In our 50-inch rainfall country, we were committing suicide by taking that one-tenth leveling and planning for that irrigation instead of doing all our thinking for drainage first. Therefore, we have had to change our thinking and put drainage first, above all; and irrigation a secondary benefit in land forming. Another immediate benefit of going to two to four-tenths in our Delta area is the following. With a two to four-tenth down slope and a liberal side slope, we cut the average yardage of dirt moved to 300 yards per acre as against 500 to 600 yards per acre when we were so foolishly trying to level our land too flat and destroying our good drainage by not following more our natural land formation.

Mother Nature has a pretty good drainage program of her own. Don't you go spending $75 per acre on land forming, that's 15 to 18 cents a yard for 300 to 500 yards per acre, unless you know that when you get through you will have superior drainage. Then, work out your irrigation plans as a secondary benefit.

CONTRACTOR IS IMPORTANT — If you have as much as 100 or more acres to land form, get a contractor. Don't try to do it yourself. As a farmer, you will have your hands full on the many little details of drainage and irrigation,

2 facts that mean something to YOU, the advertiser!



1 **The Press** is the official publication for the National Cottonseed Products Association (oil mills), the National Cotton Ginners' Association, and *each* state ginners' association from California to the Carolinas. This gives you *accepted* readership throughout these industries.

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turn rows and paths for future flumes, after the contractor has gone.

The dirt moving is just the beginning. You will need some land forming equipment of your own, some dirt moving equipment, but let the contractor do the big work and then you continue after he has gone.

The first thing we did was have our engineer draw topographical maps on approximately 3,000 acres to pick out some land to form. We paid him $1 an acre for that topographical work. Then we picked out about 1,000 acres, and he staked out those fields and prepared cut sheets on a 100-foot interval at $4 more per acre.

We had about 200 acres ready for four contractors, each had about 50 acres. We had nothing but a verbal arrangement.

YOU SHOULD GET IT IN WRITING — You should have a clear understanding with your engineer about his checking out the work of the contractor to be sure the job is finished. That's very important. It would not hurt to pay the engineer a little extra just for this check-out work. Then, have a written understanding with the contractor, that if he knocks down the engineer's stakes every 100-feet, he must repay the engineer to restake the field for the check-out.

The contractor must complete the job within one-tenth of the cut and fills called for on the cut sheet. Have an understanding with your engineer that he will give a white copy of the cut sheet showing all the new elevations after the contractor is through. When he checks out the contractor, he will note what the new elevations are in the finished work.

Bulletin 438 of the California Agricultural Extension Service on land forming, "Grading for Surface Irrigation" discusses all of these problems. It would be good to read this.

What type of dirt moving equipment should you use? We use elevating five- and eight-yard scrapers pulled by tractors and several three- and four-yard dirt buckets on the tractors. We also use a 50-foot land leveler pulled by a farm tractor with dual rear wheels. Most of the dirt moving contractors working for us also use farm tractors and elevating scrapers.

SUMMARY — I can sum up what I have to say in these four points:

1. Don't just get a good engineer. You be sure that he gives you a good cut sheet with the best analysis for minimum yardage and maximum fall and pay the engineer extra, if necessary, for checking out the contractor and giving you the cut sheet showing you the new elevations.

2. Don't have any verbal understandings with the contractor. Put it in writing that he must leave grade stakes in place until the engineer checks it out and the contractor has it leveled within a tenth. Then the contractor removes the ridge between the grade stakes and planes it three times.

3. Level with drainage instead of irrigation as the number one objective. Let irrigation be just a good by-product. Pattern your whole program for drainage and then fit your irrigation in as best you can. It will work all right.

4. Stay on the two-tenths down slope on light soil and from two to four-tenths down slope on heavy soil with some slide slop, nothing any flatter. Follow the natural land contours as much as possible on both down and side slope and yardage will be reduced from 600 yards to the acre to 300 yards to the acre or less.

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Land Forming in Rolling Areas

By T. E. CORLEY
Associate Agricultural Engineer, Alabama Experiment Station and USDA, Auburn

Farm development based on new concepts of land forming has been in progress for eight years on the Agricultural Engineering Farm Unit, at Auburn, Ala.

The API Agricultural Engineering Department obtained 100 acres of land to be used as a field laboratory for farm machinery and other agricultural engineering applications. The development of this farm was planned to serve two purposes: to provide suitable land for the operation of all kinds of farm machinery for laboratory instruction, and to establish land-preparation methods and practices. This development was made with an awareness of the present farming trends, with a prediction of future developments of farm machinery and farming practices, and with the following basic facts:

1. Farms are becoming larger.

2. Tractors and farm machinery are increasing in size and are being designed for faster operating speeds.

3. Farm labor is becoming scarcer and costlier, but more skilled in the operation of machinery.

4. The use of chemicals for pest control will increase and will require precision operations in planting, cultivating, and applying the chemicals.

The first step was to remove many rocks from the field. Most of the rocks were on or near the surface of the ground, but they were too numerous to remove by hand so a mechanical rock rake was developed.

A terracing system was laid out and constructed according to the conventional method, however, the system was not conducive to efficient operation of tractor equipment. There were sharp turns in the terraces that made it difficult to maneuver tractors and mechines even at slow speeds. The terraces were unevenly spaced throughout the field, resulting in numerous point rows that were undesirable for mechanized operations.

After mapping and studying the land, it was decided to do away with the old terrace system and to develop a new system designed to include water disposal outlets in the major draws to make it possible to straighten and more evenly space the terraces.

The new terraces were not constructed until a year later to allow vegetation in the outlets to become established. The rows were laid out on the contour so that row drainage would aid in water control until terraces could be built.

A key terrace was first laid out and whenever practicable the other terraces were laid out parallel to the key terrace. The distance between parallel terraces was always a multiple of four 40-inch rows. Where parallel terraces were not possible, the rows were made parallel to one terrace and areas where point rows occurred were sodded. Some steep areas and other areas not suited for row crops were put in sod or hay crops. Twenty-foot borders were provided along the fence lines. The outlets, borders, and other areas taken out of row crop production totaled about 20 percent of all open land. Most of the land taken out of row crops is used advantageously in the production of seed and hay crops. The borders and outlets also served as field roads.

All terraces were constructed with a broad base of sufficient width to permit four-rows between channel and ridge. Four-row equipment has been used satisfactorily to plant and cultivate cotton on these terraces.

The outlets are flat and shallow to permit crossing with equipment, which in effect, makes it possible to lay out long and continuous rows.

A land leveler was used to smooth this terraced, rolling land. This greatly improved planting, chemical weed control and other operations.

During the past three years, all the row crops have been planted and cultivated with four-row equipment.

By planting cotton to a stand and by using chemicals for weed control, hand hoe labor was practically eliminated and all of the cotton has been harvested with a mechanical picker. Yields have been good, running as high as two bales of cotton per acre under irrigation.

Soil erosion has been practically eliminated and there has been a gradual buildup of soil fertility and an improvement in soil and water relationships.

Is it practical?

The soils of the Piedmont respond readily to good management and cultural practices. Money spent developing this type of land will pay dividends through increased value of land, increased efficiency of labor and machines, improvement in soil fertility and structure, and increased yields.

Elimination of sharp turns in the rows made it possible to operate the tractor at high speeds and with great accuracy. Elimination of point rows, layout of continuous rows and use of multiple-row equipment increased the efficiency of all machinery operations.

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Future Equipment and Planting Methods

By JAY G. PORTERFIELD
Agricultural Engineer, Department of Agricultural Engineering, Oklahoma State University, Stillwater

The fundamental objective of planting cotton is to obtain a satisfactory stand. Other objectives and accessory accomplishments are of secondary importance. Providing an optimum environment for germination and emergence is a Beltwide objective. Details of how to accomplish this is where opinions differ.

Many factors affect the success or failure of planting. In turn, planting success or failure may have an important influence on subsequent cultural and harvesting practices. The State Experiment Stations, the USDA and private research organizations have, for the past 10 years, concentrated on research leading

to satisfactory stand establishment of cotton.

SEEDBEDS — The type of seedbed profile varies with the regional environment. A common method of planting in irrigated areas is to plant on some type of bed where an irrigation furrow will be formed at the time of, or prior to planting. In areas where excess moisture at planting time is a problem, bed planting is also looked upon with favor. In other areas of the country, cotton is planted in furrows to provide moisture for germination and emergence. The primary objective of a seedbed profile should be to provide the cotton plant with the maximum protection against wind and water and crusting damage.

Whether the seedbed is clean or trashy, loose or firm, the seedling environment is important. If erosion of any type is not a hazard, there appears to be little merit to having a trashy seedbed. However, if clean cultivation is impractical, it becomes imperative that suitable equipment for working in trashy conditions be available. In areas where drying is a problem, a loose seedbed probably dries too rapidly for best results. In areas where drainage is a problem, a tight seedbed is generally unsatisfactory. Unfortunately, we have no criterion with which to judge the looseness or firmness of seedbeds in terms of plant growth. Some work of a fundamental nature is now under way, the results of which should give us a better understanding of this problem.

SEED FURROW OPENERS — The type of seed furrow opener which minimizes the seedbed disturbance has been found advantageous in areas where moisture is deficient during planting. In areas of adequate moisture, the amount of seedbed disturbance seems to be relatively unimportant. Seed furrow openers must work in trashy seedbeds. Seed furrow openers should be capable of a uniform depth of planting and should have a positive means of depth adjustment. The seed furrow opener should leave the seed furrow undisturbed underneath the seed. This is particularly important in dry areas.

PRESSING AND COVERING — In some sections of the Cotton Belt surface pressing with rather heavy weights is used to leave a smooth surface for other operations, such as pre-emergence chemical applications or subsequent flame cultivation. In many areas, this type of pressing provides a temperature-moisture environment satisfactory for germination and emergence. The mechanical restriction to emergence from this type of pressing is not detrimental in areas of high rainfall. In other areas, it appears extremely desirable to press the seed into the moist soil before covering and cover the seed with loose soil. Surface pressing in these areas has not been satisfactory. We know very little about the exact degree of firmness under, to the side and above the seed as it relates to moisture and air complexes and crust formation.

TYPE OF SEED AND SEED METERING— In the western and southwestern cotton growing regions, acid-delinted or mechanically delinted seed is gaining popularity. I think we should look forward to the time when all planting seed will be prepared in this manner for planting. Changing the type of seed permits us to do a rather good job of precision planting. As the nature of the seed is changed from non-flowing fuzzy seed to free-flowing seed, there will need to be some changes in the type of seed metering device. Seed metering devices presently used on other free-flowing seed will, no doubt, be the basis for the design of future cotton metering hoppers. We may have to devote additional research to finding a seed metering device which will operate accurately at higher speeds. There appears to be real merit in grading seed to increase the uniformity of planting seed. There is some evidence that the grading of seed will improve germination, that the small and large seed should be discarded, and the medium-size seed used for planting.

ACCESSORY ACCOMPLISHMENTS — Although we are making progress in determining the exact location of fertilizer as it relates to the amount and placement relative to the seed, we are still in a state of flux regarding the equipment for applying it. The same would apply to the equipment for applying fungicides and insecticides in the row at planting time. The use of pre-emergence chemicals is receiving a great deal of attention. There is still much that we need to learn about both application and the fundamental workings of these chemicals on cotton. The equipment to do this is the subject of considerable difference of opinion. How smooth does the surface need to be for pre-emergence application, is surface pressing desirable in all areas of the country, and what carrier rate, width of band, etc. are optimum?

Stand assurance with one planting must be a reality if we are to achieve the goal of lower production costs. The best way to accomplish this is through a vigorous research program which leads to an understanding of the optimum environment for seedling germination and emergence, fosters the development of high capacity machines and machine components which will provide this optimum environment, and results in planting methods and equipment which promote progress in other cotton production practices.

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JAY G. PORTERFIELD, agricultural engineer, Oklahoma State University, (standing) opened the second session Friday morning. Others are Dr. Charles W. Upp, director, Louisiana Agricultural Experiment Station, Baton Rouge, (center) and Dr. George E. Smith, professor, department of soils, University of Missouri, Columbia.

Forms and Placement of Fertilizers for Lower Production Costs

By DR. GEORGE E. SMITH
Professor, Department of Soils, University of Missouri, Columbia

The development of the fertilizer industry has been closely associated with cotton production on the highly leached soils of the Southeastern States. Extensive fertilizer use on the more fertile alluvial lands is a comparatively recent development. We are now using nearly 40 times as much plant food as before the war. This gain has resulted from profitable returns on greatly reduced acreages. Few soils, regardless of how deep or initially productive, can supply the required nutrients for most efficient and profitable cotton yields. We are rapidly approaching the time when most cotton produced in the humid area will receive some fertilizer.

There have probably been more developments in fertilizer chemistry and understanding of soil fertility and plant nutrition in the past 10 years than in the previous period of development in the fertilizer industry.

A better understanding of soil fertility and the nutrition of cotton has changed concepts of fertilizer use. Application of fertilizer is changing from the application of a certain amount of mixed goods, that return a greater value than its cost, to systems where soil fertility is removed as a factor in production. Except for the cost of fertilizer, it costs little more to bring a two-bale crop to time of harvest than one that produces only 300 pounds of lint. The investment in the crop can no longer be jeopardized by an insufficient or improper balance of plant nutrients. Much attention has been recently given to the use of soil tests as a measurement of fertility balance. These tests

are not perfected but provide the best tool now available.

Placement of Fertilizer

A large percentage of the fertilizer used in the past on cotton has been mixed goods applied in the row at time of planting. Much research work has shown that placement of this material slightly below and from two to three inches to the side of the seed will have the most desired "starter" effect. Too close placements may result in injury to the stand from soluble salts. If farther away the plants may be stunted before the roots reach the nutrients.

Even with the best machines available it is not possible to apply sufficient nutrients close to the row at time of planting to secure more than a starter effect. Greater amounts applied deeper are usually required for most profitable yields.

Much of the equipment now available was designed in a period when the amount applied per acre was small. Because of the inconvenience and need for frequent filling many of our land owners are bedding or plowing down all of their soil treatments for cotton. Our experimental work on a wide variety of soils indicates this is not efficient.

It is most important to have an adequate supply of available phosphorous close to the young cotton seedling. Our results show, on most soils, that we receive a response from phosphorus until the plow layer contains about 600 pounds of P_2O_5 in an available form. The cost of such a treatment is high. But this expense can be reduced by providing concentrated bands close to the young seedlings.

Failure of fertilizer distributing attachments for dry materials, to keep pace with other machinery developments, to permit the application of the greater amounts of nutrients being used has, in a large part, been responsible for the failure to apply starter fertilizers—particularly where fields are large. This has also been a stimulus to the development of liquid materials as well as the use of fertilizer materials and bulk spreading.

New Fertilizer Materials

A number of new fertilizing materials have become generally available in the past 10 years that promise to replace some older materials or take over a large part of the future increase in demand. Properties of these materials that will reduce labor requirements in handling as well as cost per unit of plant food applied will be important considerations.

ANHYDROUS AMMONIA — Anhydrous ammonia is now the principal source of nitrogen for direct application. Its increased use will probably continue since at the present time it is the cheapest source of nitrogen (applied) when used in quantities required for optimum cotton yields on most soils

Our research work shows that if as much as 100 pounds of anhydrous ammonia per acre is applied in 40-inch rows that few soils can absorb the quantity at the point of release. If the ammonia is applied when soils are wet, the ammonia dissolves in the soil water, moves to the surface as the soil dries, and a considerable quantity may be lost to the air. This loss may be greatly reduced by closer knife spacing. It is suggested that knives be placed not more than 12 to 16 inches apart for preplant applications. There should be sufficient power to place the material at least six inches deep in the soil. Maximum efficiency can be obtained by applying when soils are at optimum moisture content.

AQUA AMMONIA — Our results have indicated little difference in crop response from aqua or anhydrous ammonia. It is probably not necessary to place aqua as deep in the soil as anhydrous and it can probably be used more satisfactorily when soils are very dry.

NITROGEN SOLUTIONS — Most nitrogen solutions are corrosive to low cost metals, and require special applicators. They are cheap, and easy to handle. Solutions containing no ammonia have no pressure and may be applied to the soil the same as solids. Soil reactions will be similar to applying solid nitrogen materials to a dry soil.

The low-pressure nitrogen solutions contain some free ammonia and must be placed in the soil to prevent loss. We have obtained good results when these materials are placed only two to three inches deep.

SOLID NITROGEN — A number of solid nitrogen materials are now available ranging from 16 to 45 percent N. Some of our observations with Urea have not agreed with theory. The lasting effect and delay in cotton maturity have been greater than our soil chemistry work would indicate. Perhaps there are other soil reactions of this material that are not yet fully understood.

BALANCE NITROGEN WITH OTHER ELEMENTS — Our results in fertilizing cotton indicate it is not possible to supply sufficient nitrogen before planting to obtain maximum yields. Applying the entire requirements before planting usually results in excessive vegetative growth and poor early set. If only a moderate amount is added, the supply is inadequate later in the season and yields are reduced. Side dressing may be the answer, but in our soils these later applications have not been too successful in producing maximum yields except when irrigation is available.

On most soils mineral treatments must be stepped up to balance the greater quantities of nitrogen now being used. The residual acidity from most of the forms of nitrogen calls for greater use of lime. Although cotton has a low calcium requirement, there is an increasing number of reports of failure to obtain the expected response from fertilizers because soils were too acid to obtain efficient utilization of other elements.

MIXED LIQUIDS FERTILIZER — There is little difference in crop response from these materials and solid fertilizers of the same analysis. They are growing in popularity because of ease of handling and ease of placing in the desired position relative to the seed. I know of machines where sufficient liquid can be loaded on a tractor (by pump or air pressure) to apply starter fertilizer for 10 to 20 acres without refilling. This convenience and saving of labor is popular.

PHOSPHORIC AND SULFURIC ACIDS — Phosphoric acid has been inferior as a source of phosphorus when applied directly to acid soils. However, when applied with rock phosphate it has given good results as manufactured super phosphate with a substantial saving in cost. The substitution of spent sulfuric acid (cost 72 cents per acre) with rock phosphate produced an increase in wheat yield in 1957 worth over $32.00. Here in a field where the fundamental research is completed and its use in increasing efficiency of crop production await the development of the necessary machines for application.

BULK SPREADING — The increased use of plant food per acre has stimulated the use of straight fertilizer materials for correcting fertility deficiencies or for plow-down application. Spreaders with three hoppers are available that will permit the simultaneous application of three materials in any proportion.

Custom truck application is expanding where the materials are blended in a central plant or where the truck will contain three hoppers and any desired ratio may be applied. Certainly anyone interested in the mechanization of cotton production or in the design and manufacture of machines to plant cotton and apply fertilizer should carefully consider the possibilities of these methods of application.

New Fertilizer Equipment

In the cotton-growing area, fertilizer equipment was developed to apply relatively low analysis mixed materials. In many areas this equipment still may be adequate. However, there is a need for planters that will properly place starter materials. If dry materials are to be used the size of hoppers must be greatly increased. This may require transferring the load to the tractor and devising means of conveying the material to the planter shoes. Ease of filling hoppers must be considered if dry mixed fertilizers are to continue in use on large operations with a dwindling labor supply. Perhaps some attention should be given to bulk handling of dry mixed fertilizers to save labor and bagging costs.

The mixed liquid fertilizers, as well as the possibilities of reducing costs by the manufacture of available phosphate from rock phosphate and acid in the field, should be studied by farm operators as well as industry, in consideration for mechanizing the cotton crop. Perhaps other tools can be adopted to apply fertilizer with some other operations and save time and costs. We have applied anhydrous ammonia with a moldboard plow or with a middle-buster. Nitrogen solution and liquid fertilizers have been applied with attachments while discing or using a field cultivator. We have found a drag harrow equipped with hollow teeth a most satisfactory tool for applying these liquids. Certainly there are many opportunities for improving our present methods.

This increase in fertility additions will change other mechanization practices in cotton production. Plants will probably be larger. Maturity will frequently be delayed. Late weeds may be stimulated and a more vigorous foliage will complicate insect and disease control.

In forecasting the outlook in the fertilizer industry, I can see only a continued increase. I believe that future trends will be closely associated with methods that will permit mechanization and reduce the labor of handling the increased quantities that will be needed.

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Impact of Supplemental Irrigation on Cotton Mechanization

By REX F. COLWICK
Coordinator, Regional Cotton Mechanization Project, State College, Miss.

Land selection is the first step in planning for irrigation. Putting cotton on land selected for best irrigation should have more good effects on mechanization than bad. Land that lends itself to irrigation lends itself to mechanization.

On the bad side of the ledger is the fact that it may not always be economical to irrigate the most fertile land on a farm for several possible reasons. The water source might be too far away or the topography may make the cost of leveling a questionable investment. It may be more profitable to irrigate a less fertile yet more convenient field.

SELECTING THE LAND — After selecting the land, some earthmoving will usually be required to improve drainage. Even a hillside being prepared for sprinkler irrigation needs some smoothing to eliminate low spots. Any type of land forming will facilitate mechanization by giving the equipment a smooth, well-drained surface on which to operate.

If there is anything bad about land forming it can be in the cost of doing it. The capital investment in the necessary equipment demands that it be a custom operation on all but the very large farms. Then, the question arises as to how much a farmer can afford to spend on land forming. This is one of the "need to know" items, and there are others. How will various depths of cuts and fills affect yields on the many soil types? How can we measure this scientifically? Once the land is formed, we know that it will have to be maintained each year. What machinery and management practices will be necessary? Will it be possible for the farmer to do this himself, or will this also be a custom operation?

CROP RESIDUE MANAGEMENT — A prerequisite to good land forming and seedbed preparation is good crop residue management. This will pay off in all of the other steps, from planting to harvesting, as well. The question of thorough disposal of larger plants, including the roots, immediately looms as an unanswered one. It involves high power requirements and machines that we do not yet have.

Poor infiltration may make the cotton develop a shallow root system which will require more frequent irrigations, and this in turn will make weeds grow more rapidly. We will need to find out more about the influence of various types of deep tillage on infiltration in all soil types.

Planting practices will probably not be affected much by irrigation in the humid region except that more uniform stands can be expected on level land. And where sprinkler systems are used, it will be possible to irrigate early to insure complete emergence and to activate pre-emergence weed control chemicals. Non-uniform beds cause non-uniform water furrows, resulting in variations in the wetted perimeter and, of course, variations in the rate of application. Some of the things we need to learn are: How can we get more uniform beds? Can we plant on lower beds and form a broad, shallow water furrow later, as is often done in the West? Will optimum stands for mechanization change under irrigation?

IRRIGATION AND FERTILIZATION—What impact will irrigation have on fertilization? There is no doubt that it will make higher rates pay, but there are some bad angles and many unanswered questions. Excessively high fertilizer rates coupled with excessive rainfall will promote excess plant growth, and encourage lodging and boll rot. Optimum fertilizer rates, types, and application timing will have to be determined for each case.

IRRIGATION AND WEED CONTROL — The impact of irrigation on weed control is one of our biggest worries. Any good effects are doubtful, aside from the suggestion that sprinklers be used to activate the pre-emergence chemical during a dry planting season. Rains following irrigations will cause the most trouble by delaying operations and inducing excess plant growth.

Another big problem is late weed control. Normally, lay-by will not be possible until after the last irrigation has been made. If grass is not kept under control until that time it is apt to lower the quality of machine-picked cotton. The big problem will be in getting equipment through the field, either because of wet ground or rank plant growth. It may be possible to integrate the so-called "lay-by" herbicides and early-season herbicides, and perhaps flame, with a system of skip-row management that would make it unnecessary for the tractor to travel through the normally-spaced rows but would travel on dry alleys or machineryways between blocks of several rows.

Another innovation is the use of an artificial mulch such as paper or plastic. Another possibility is that weed control chemicals could be applied in the irrigation water like fertilizers.

IRRIGATION AND INSECTS—Like weeds, insects and diseases will thrive when irrigation provides a moist, shady environment. The problems involved in applying pesticides are similar to those for late weed control, centered around getting through the field. Airplane application will be used where feasible, but there are many fields that defy effective aerial coverage. The skip-row management idea suggests itself again as a possible solution because the spray boom is all that we are interested in getting over the cotton. A 40-foot cantilever spray boom may be unwieldy, but new light-weight materials and hydraulic controls may make it practical.

We need to learn more about coverage too. Someone recently said that only 15 percent of insecticide spray was actually deposited where it could be effective. A six-year nozzle placement study in Texas shows that one nozzle per row can be as effective as three for certain types of insect control. If this should be applicable to rank irrigated cotton, it may be possible to get adequate coverage with the boom-jet type sprayer. If that works, then why not make a big one that would spray 40 rows "with the wind" instead of eight? How about pelletized insecticides? They could also be distributed without a cumbersome boom. Applying insecticides in the irrigation water may not be an impossibility if a sprinkler system is being used.

IRRIGATION AND HARVESTING — Irrigation will probably have more good effects on harvesting than bad. The mechanical picker thrives on high yields, large fluffy bolls and smooth, level fields. There wil be fewer undeveloped bolls and tight locks. Yields will continue to improve. The good farmers who make over a bale per acre on dry land today will be shooting for the two-bale-plus mark under irrigation.

SOME PROBLEMS — There also will be problems, of course. The fruiting period will be longer, probably calling for two or three pickings. This will rule out the use of the stripper-type harvester except for the last harvest. Rank growth will often cause lodging and more problems with bark and green leaf stain. If growth is too rank, and especially if it is lodged, the first picking will damage the plant and reduce the yield of later pickings. These prospects will discourage the trend toward smaller, cheaper pickers in the humid areas where irrigation is widespread.

SUMMARY — To make the most out of mechanization under the influence of irrigation, there are a number of questions that need to be answered in regard to mechanical harvesting. Will the expensive high-drum picker be the only answer to the rank growth problem, or is there some other way of picking cotton by machine? Is it possible more nearly to tailor the plant to the machine through spacing and cultural practices and through breeding? If the Texas High Plains area can grow one bale per acre on one-foot cotton, why can't we grow three bales on three-foot stalks in this area? What can be done with chemical growth modifiers to change the plant size? Will "topping" of the plant help in this area as it has in California? If so, perhaps we can go further with this idea and prune the plant to the size and shape we need. The problems in management relating to time of defoliation and number of pickings will have to be worked out anew to be applicable to irrigated cotton.

Moisture and green material in machine-picked cotton presently give trouble by causing heating and staining in temporary trailer-storage. This occurs under conditions found in the West as well as in the humid areas, and it can be reasonably expected that irrigation in the humid areas will also add to the problem of field handling and storage of seed cotton.

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Tailoring Irrigation Systems to Specific Practical Needs

By JAMES L. GATTIS
Agricultural Engineer, Arkansas Agricultural Extension Service, Little Rock

The objective of an irrigation system is to furnish water to the soil in the desired amount when and where needed. To do this for a permanent type agriculture requires that the water be distributed uniformly and efficiently with-

out eroding or harming the soil, damaging the crop, or hampering succeeding cultivating or harvesting operations. Each production practice and factor should be considered along with the basic resources of water, land, labor and capital. Then, when each item is evaluated and given its proper place in relation to the other items considered, we could say the irrigation system was tailored for those specific conditions.

WATER AVAILABILITY — The first step in designing an irrigation system is to determine the amount of water available and its relative location with respect to the area to be irrigated. In new or questionable areas, the water quality should be checked for suitability.

The rule of thumb which calls for 10 gallons per minute per acre to be irrigated is quite good and serves a useful purpose. The designer will usually come out with a different water requirement and should have that freedom as long as the figure can be justified. Factors such as the means of taking the water from the source to the point of distribution, the number of hours per day used, the type of distribution system, the crops to be irrigated, and the climatic conditions all have a bearing on the water requirements for irrigation.

PRELIMINARY SURVEY —A preliminary or hasty type of topographic survey is the second step in tailoring an irrigation system. Even an experienced planner can be misled by a hasty survey so extreme care and consideration should be taken in evaluating factors before even a preliminary topographic map has been made of the area under consideration.

SOIL SURVEY — The soil inventory may be made concurrently with the preliminary survey where a detailed soil survey is not required. This may be the case under a wide range of circumstances. In any event, the texture of both surfaces and subsoil should be determined as well as their depths. The location and thickness of any pan conditions found in the soil profile should be noted. The presence of these compacted layers is of sufficient importance to justify the modification of an irrigation system. The length of runs may often be increased without materially increasing the amount of water wasted or decreasing the irrigation efficiency. Even the size of furrow stream used may be modified by dense soil layers.

The very slow rate at which water will go through some dense compacted layers is the reason for the design modification. In one way they are helpful but in another they are a hindrance to utilizing the full potential root zone for storing irrigation water for plant use.

Soil samples of both the topsoil and the subsoil should be taken and sent to a soils laboratory for an analysis of plant nutrients available and fertilizer needs. This is even more important where considerable earthmoving work is planned to get the field to the desired grade for efficient irrigation, drainage and mechanization.

DETERMINING IRRIGATION METHODS — Only three general methods of irrigation are used to any extent in this area. They are flood, furrow and sprinkler.

Irrigation methods will vary across the Cotton Belt in different states and on individual farms because of differences in water supply, soil, topography, crops, farming systems, labor, capital available and customs. One or a combination of several methods may be suited to one farm. It is the farm owner's responsibility to select the irrigation method and system which fits his particular needs and desires.

However, it is the responsibility of the irrigation engineer to recommend the irrigation method and system which will do the best job and give the greatest return per dollar invested for the longest time.

The best tailored irrigation system cannot give the best performance unless operated properly and in accordance with the designers' recommendations.

SURFACE IRRIGATION—General topography and micro topography are important factors in determining the method of surface irrigation. The soil profile and textural make-up are also major factors. Preliminary indications are that some of the soils having this topsoil underlain with poor subsoil, from both a physical and nutrient standpoint, will fall off in production when the topsoil is removed in preparation for irrigation.

Row crops, although normally furrow irrigated, may be irrigated by a border type method. Cultural practices and the equipment used for insect control or harvesting may restrict the type of irrigation. For example, the contour border type of irrigation for cotton hinders cultivation, the use of ground type insect control equipment, and hampers mechanical harvesting. An advantage of the contour border type of irrigation on row crops is that inexperienced, cheap labor can get more water into the soil with less effort. Also a minimum amount of land leveling is required by the contour border system.

The furrow type of irrigation requires land preparation, a distribution system, and an irrigator with an understanding of what he is trying to do.

The straight border type of surface irrigation combines some of the advantages of contour levee irrigation and furrow irrigation, provided the field is suitable and properly prepared. With this method it is possible for one man to irrigate 150 to 200 acres of land. Also obstructions to other farming operations are eliminated. This is important in a mechanized agriculture.

LABOR AND MANAGEMENT RESOURCES—Lack of experience and appreciation for irrigation by the labor which is supposed to handle the irrigation work is an obstacle which must be overcome. This situation may be a blessing in disguise because it will bring about more system refinements and the use of labor saving devices for handling irrigation water. A properly designed and installed irrigation system increases the acreage one man can irrigate By increasing the efficiency reduces the operation cost.

COST OF PRODUCTION — One of the main reasons irrigation is being used in the humid regions of the United States is that the greatest efficiency gives a lower cost per unit of production. To the farmer this means more net income now. It also puts him in a better position to sell on a competitive market, both domestic and foreign, with either the same product or competitive products.

Now to accomplish the most over the longest period from irrigation, the farmer must have the type of system which will permit relatively uniform distribution of water without eroding, leaching, waterlogging or otherwise adversely affecting the productivity of the soil.

When planning an irrigation system the farmer should secure the best help available because both the planning and the system design itself are a combination of complex factors.

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JAMES L. GATTIS, agricultural engineer, Arkansas Agricultural Extension Service, Little Rock, (right) addressed the Friday afternoon session. Other speakers seated (l. to r.) are H. C. Sanders, director, Louisiana Agricultural Extension Service, Baton Rouge; C. M. Merkel, engineer in charge, U.S. Cotton Ginning Laboratory, Stoneville, Miss.; Marvin Hoover, cotton specialist, California Agricultural Extension Service, Shafter; and Rex F. Colwick, coordinator, regional cotton mechanization project, State College, Miss.

Realizing Greatest Gains From Mechanically Picked Cotton

By TRIMBLE R. HEDGES
Agricultural Economist, University of California, Davis; and
MARVIN HOOVER, Extension Cotton Specialist, Shafter

In the late 1940's the mechanical cotton harvester came of age. Our best estimates for California indicate that by 1951 over half the crop in our state was mechanically picked.

Such a sharp change in technology for a major crop inevitably brought major problems. The cotton growers discovered early that the matter of shifting from hand to mechanical picking was not merely a matter of learning to operate a machine. In order to use the machine with reasonable efficiency, most farmers found fundamental changes in technology and practice essential. Both researchers and extension workers had their work cut out for them. We met this situation in California with a comprehensive and thoroughgoing research program that began right with the elemental questions of row-spacing and plant population.

It was quickly determined that harvesting efficiency was kept at a maximum by an alert, well-trained operator. Other factors affecting the efficiency were: the nearness of the bolls to the ground, plant height, the final row profile, the loss at the row ends and the date of picking. Studies and comparisons were made of such things as ridge and flat planting; continuous seeding without thinning; hill-drop seeding; mechanical, chemical and flame weed control; defoliation; varieties; and moisture of machine and hand picked cotton.

FARMER KNOW-HOW — Most farmers did not acquire all this know-how and perfect their technology over night. As a matter of fact, one of the pressing problems today is that some farmers still have much to learn, and have a great deal of room for improvement in how to use their mechanical harvesters. Nevertheless, by the early 1950's, fairly widespread understanding existed among farmers in our state of what it was reasonable to expect of mechanical cotton harvesters, what conditions had to be met to use them efficiently, and how they would affect farm earnings.

PROBLEMS CREATED — Our problem focuses on the period beginning in 1950 when we undertook to answer the questions posed at the beginning of this paper. Seldom has any like period included as many important changes as this one presented to cotton growers. Essentially we are asking: how have the forces that brought these important changes affected the economics of using the mechanical cotton harvester on individual farms? In 1950, and again beginning in 1954 and continuing through the 1957 season, the Secretary of Agriculture, under the existing statutes, imposed cotton quotas and individual acreage allotments. Also, a reasonably steady and continuing upward trend in prices and costs has persisted during the same period.

Fortunately, other important forces worked in favor of the cotton grower in his efforts to use mechanical harvesting equipment profitably. We recognize at once three strong influences in this direction, the effectiveness of research and extension in providing growers knowledge of improved technology, the efforts of machinery manufacturers to develop equipment adapted to varying conditions, and the success of individual farmers in improving technology, practices and management both in producing and harvesting cotton.

MECHANICAL PICKER PAYS OFF — A sample of California growers studied in 1949 and '50 were one-picker owners, and averaged 145 acres of cotton per farm. Under the allotment program these growers find their cotton cut to 75 acres—almost 50 percent. The findings from the earlier study underscore the importance of this change to the farmer. The data indicated that with the yields then prevailing such growers actually could have harvested effectively 200 acres of cotton with one machine, rather than the 145 they actually operated. Considering acres alone, it is evident that the result of acreage allotment is to reduce sharply the proportion of full potential capacity that the machine operates. This is a strong negative influence on profitable mechanical picking.

Furthermore, the second major adverse factor—rises in prices and costs—operates to aggravate the reduced acre problem. This is because, as the earlier study demonstrated, the major cost item in mechanical harvesting is the high overhead, including depreciation and other fixed costs that go on pretty much the same regardless of the amount the grower uses the machine. All these overhead costs are related to the initial outlay for mechanical harvesting equipment. Here the effect of rising prices was to raise the original cost for comparable equipment from somewhat less than $10,000 to about $13,000. Considering this factor alone, again, the effect was to increase the difficulty of the individual grower in using his equipment enough to hold down overhead cost per acre and per bale.

In addition to the overhead costs, some increases occurred in operating costs; the outlays necessary to cover repairs, fuel, labor and other items. We can separate the influence of the acreage drop from the cost rise by pointing out that if these same growers had been able to keep their 145 acres of cotton, but had to face the increased prices in costs, they would have been able to operate their pickers at about $26.00 per acre as compared with $20 in the earlier period. The result of the acreage cut, however, was to increase this current cost per acre under 1957 conditions to $43.00. These are serious obstacles to the cotton farmer as he strives to hold down his costs and maintain his profits.

FERTILIZATION AND IRRIGATION—Farmers have given closer attention to such practices as nematode control to not only increase yields, but to also have cotton which is more uniform in growth and maturity. Higher rates of fertilization to increase yield is practiced; however, more attention to irrigation frequency has been necessary. With the higher fertility levels the practice of frequent irrigation results in excessive vegetative growth. Topping of rank growing cotton is practiced to prevent lodging, as lodged cotton is very difficult to defoliate, boll rots increase and machine havesting losses are greater. More attention is being given to insect control through the practice of supervised insect control.

The loss of fruit set usually results in unbalanced boll load, a more vegetative-type growth, uneven maturity and interferes with defoliation and harvesting. More attention is being given to preparation of fields for irrigation. More frequent releveling to the grade best suited to the soil type is noted. Length of irrigation runs has been shortened. Many irrigation runs of one mile have been cut to one-half and one-half mile runs have been cut to one-quarter runs as an example.

QUALITY AND MACHINE HARVESTING—Farmers are more conscious of maintaining the quality of machine harvested cotton. They are quite aware of the preservation problems of picker twists, green leaf stain, excessive trash, oil and grease and extraneous matter. Closer supervision of the operation is given so as to operate the pickers for best quality as well as maximum efficiency.

It is well to comment on the favorable influence of the efforts of farm machinery companies building cotton pickers to improve the design of their equipment and to simplify maintenance. They have made important progress in both directions. Several models of both one-row and two-row equipment now are available and so-designed as to meet the needs of growers under varying production conditions. Changes and improvements in design also have simplified seasonal maintenance and repair problems. The companies have developed mechanical pickers to the point that those growers who utilize the services available to obtain a throughgoing annual reconditioning, usually experience only minor difficulties during the harvest season.

Without these developments the effects of rising prices would have been much more drastic on cost to the grower. As it is, price rises for both materials and labor have brought the cost increases indicated above. We should also mention that the gains from experience provide more accurate information on the useful life of mechanical cotton harvesters. Here is another advantage of the thoroughgoing annual reconditioning. Under normal operating conditions machines receiving this treatment, essentially replaceing all worn moving parts, will continue to provide effective service for 10 years or more. This fact is highly important in reducing annual depreciation costs.

COTTON HARVEST STUDY — What can we conclude from this re-examination of findings from the earlier California cotton harvest study in the light of changes brought about by new forces during the intervening years? In order to give a complete answer we need to consider not only the information presented up to this point, but also grade and field losses in using mechanical pickers.

Before doing this, however, let's see what we can conclude about the effects of yield increases on annual cotton picker capacity. We indicated earlier that the 1949-1950 study showed that under the conditions prevailing, the cotton grower could expect to harvest about 200 acres with one mechanical harvester. The effect of the sharply increased yield has been to lower this figure in some degree. If we assume that 500 hours of operation represent a normal season's use for a mechanical pick-

er, it would appear that a grower could expect to harvest about 180 acres of cotton with yields of a bale and a half to the acre, 170 acres if he obtained yields of two bales, and about 160 acres at yields of two and one-quarter bales—the latter being approximately the yield that the growers interviewed in 1949 would have under 1957 conditions with the same propotional increase as the state average.

It is evident, therefore, that with a 75-acre cotton allotment these growers are able to use only about half of the potential capacity of their pickers. We can conclude further that the same basic findings established in the earlier studies still hold. Direct picking costs, overhead and operating expenses vary inversely with the acres harvested. For any given number of acres a similar inverse relationship is found for yields; the higher the yield the lower the cost per bale. It is perfectly clear, therefore, that the individual farm operator has a highly critical responsibility in holding down costs and getting the highest possible profit from his mechanical picker. If he has the know-how and the managerial ability to get maximum possible yields, at the same time plan his cultural operations for the most effective machine picking, and supervise the latter so as to minimize grade and field losses, then he will obtain maximum profits from his picker

TODAY'S COSTS — It costs more to own and operate a mechanical picker than it did back in 1950. Sound technology, up-to-date know-how, and capable management are the critical factors in getting profits from a mechanical picker.

It is a matter of giving careful thought and taking correct action on all of the factors of production and harvesting. Yield and quality are limited by the strength of the weakest factor and we can only fill the barrel to the level of the shortest stave. Having optimum plant population for high yields and harvesting efficiency; keeping insects under control; maintaining weed control to prevent reduction in grade due to presence of "grass"; integrating irrigation practices with soil characteristics; fertility; structure of the plant and the date at which the plant reaches maturity; maintaining the picking machine according to recommendations with respect to repair, adjustments, cleanliness and replacement of worn parts; supervising the operation of the pickers at all times in respect to these points, as well as moisture rates and other features which effect quality and efficiency, are all part of the job of getting the most out of our resources.

High yields are essential for the small operator whose acreage allotment has cut him sharply below the potential season's capacity for one mechanical picker. This operator also is under even more pressure to use his machine efficiently so as to minimize great field losses. These figures indicate that it is little harder to get a given amount of profit out of a harvester than it was before the changes of the last seven years occurred. Nevertheless, a farmer with acreage yields of two and one-quarter bales per acre or more will find it to his advantage to use a mechanical picker if he operates 50 acres or more of cotton.

We find in our area that most of the trade-ins under which a grower trades in an old machine and buys a new one, involve exchanging one-row for two-row equipment. Naturally, the farmers making these exchanges are not the small operators about whom I have spoken; they are the larger operators who in the past have found it necessary to use two or more one-row machines. These growers apparently are convinced that it is profitable for them to switch to two-row equipment. Evidently they believe that this equipment will reduce costs on their operations as compared with single-row machines.

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Latest Developments in Storing and Ginning Machine Picked Cotton

By C. M. MERKEL
Engineer in Charge, Cotton Ginning Laboratory, ARS-USDA, Stoneville, Miss.

Gins with modern equipment can produce quality fiber from average to good machine picked cottons. Thus, through the use of new and specialized seed cotton cleaning equipment, adequate driers and gin lint cleaners, producers can realize some of the profits afforded by a reduction in harvesting cost through mechanical pickers. Prior to these developments quality losses usually nullified economies in mechanical harvesting. However, even with improvements made in machinery, not all ginning problems associated with mechanical harvesting have been solved. "Storing and ginning" covers an area where much research is needed.

LOW COST STORAGE ESSENTIAL—Modern gins with adequate drying and cleaning equipment to satisfactorily handle machine picked cotton, but with no seed cotton storage facilities, cost upward of $150,000. New gins with four stands can turn out about five bales per hour but because of the tremendous peak of the short mechanical harvest season they are often hard-pressed in acquiring sufficient volume to justify the investment.

Studies have shown that permanent seed cotton storage facilities range in cost from $50 to $100 per bale of installed capacity. With such an investment, there is little opportunity for financial savings in attempts to greatly increase gin volume, over long periods, by providing extensive storage facilities for cotton in excess of ginning capacity. The answer to cost then seems to lie in the ability of operators to reuse storage capacity or to find less expensive storage facilities. Because of the high cost of storage in permanent structures, research is underway in a search for satisfactory low cost temporary gin yard storage.

In the current studies, trailers are used for storage of seed cotton for periods of up to one week. The boxes or trailers used are a demountable type designed to hold four bales of machine picked cotton. It has already been determined that the use of such trailers will reduce the first cost over conventional trailers when used for storage. Also, they cost less per unit of volume to operate than permanent house storage because of the savings in labor and power necessary for handling the seed cotton. In addition, such trailer storage carries lower per bale insurance rates than permanent storage located on the gin yard.

PRESERVING FIBER & SEED QUALITY—Important problems connected with the storage of machine picked cotton, are those involving quality preservation. Machine picked cotton usually contains more moisture than hand picked lots due in part to green foreign matter. This foreign material may contain up to 75 percent or more water thereby greatly increasing the moisture content of the cotton. Other sources of moisture include that added by picker spindles and that in and on cotton picked from dew-laden fields early in the morning. Some lots of machine picked cotton used in the storage tests at the Laboratory have been tested and found to contain 20 percent moisture. These tests have also shown that *only* those lots containing seed with moisture content of less than 12 percent can be held in storage without treatment and without heating. Tests have shown that all cotton containing 14 percent or more moisture in the seed will heat and if unchecked will show color damage after ginning. It is apparent from these and other tests that moisture control or moisture removal is the key to the safe storage of machine picked seed cotton, either on the farm or at the gin.

In gin yard trailer storage studies, attempts have been made to control heating by using the "oil mill system" or pulling air through the loads of stored cotton. Such treatments have been found to reduce the temperature of loads which have begun to heat, but have failed to remove sufficient moisture to prevent the load from heating again.

PICK COTTON WHEN DRY — Proper picker operation and handling of the cotton on the farm before it is brought to the gin hold much promise for successful storage at the gin. Studies of the rate of spindle moisture application and time of day of picking have shown that the moisture content of the cotton on the stalk closely follows the relative humidity of the atmosphere. Samples picked at 6 a.m. when the humidity was up to 90 percent and dew still on the plant contained as much as 20 percent moisture, whereas samples picked from the same field after 9 a.m. when the humidity was down to 44 percent contained 9 percent moisture. Loads picked under such ideal conditions in the middle of the day would present no problem in storage and would turn out high grade fiber with much less treatment at the gin.

Added moisture from spindle applications can play an important part. Such applications should be held to a minimum because under borderline conditions the addition of even one percent extra moisture to the seed cotton might cause trouble.

Even though defoliation studies have failed to show grade benefits in most cases, the practice could result in the picking of lower moisture seed cotton because such cottons generally contain less green foreign matter and the unpicked cotton will dry faster because of better exposure to sunlight and air. Slightly better cleaning results from al-

lowing green foreign matter in seed cotton to dry before it is ginned. However seed cotton storage should be considered primarily from the point of view of increasing gin operating efficiency rather than lint grade improvement.

FIRST COME, FIRST SERVED—Cooperation between ginner and producer can help greatly in alleviating problems connected with ginning cotton and handling it on the gin yard. The old system of first come first served does not fit into the picture as best for all concerned. Gin treatments suited for clean hand picked cotton are not sufficient for damp trashy machine picked cotton. Hand picked cottons are usually dry and can be stored safely, while a large portion of machine picked loads cannot be stored. Systems for separating such cottons have been successfully worked out at some gins to allow for ginning each type of cotton under optimum conditions. Producers should avoid mixing loads of damp and relatively dry cotton. Producers knowing that gins are crowded during peak periods could avoid trouble by sun drying early picked cottons before loading. Ginners, in turn, can avoid long periods of storage by running around the clock during peak periods, and by keeping gins in repair to avoid breakdowns and loss of time during such peak periods.

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Pay-Off From Latest Cotton Production Know-How

By H. C. SANDERS
Director, Louisiana Agricultural Extension Service, Baton Rouge

Prior to 1950 much of our cotton information was given out in "broken doses." Information relating to the production, harvesting and marketing of cotton was too often presented in individual bits without being related to the whole program. In 1949 we tried to think through the pressing problems which cotton farmers were facing and the specialized areas of knowledge which should be brought to bear on the solution of those problems. We decided that the first area was in the general cotton situation, the outlook with regard to demand, support prices, probable costs, etc.

Secondly, farmers needed the latest and best agronomic information relating to the selection of soils, seedbed preparation, varieties, fertilizers and cultivation.

Thirdly, we realize that successful cotton production in Louisiana required insect control, and we realized that cotton insect control had become a complicated and rather scientific process.

Fourthly, we concluded that if cotton production was to be carried on successfully and economically in Louisiana that more and more mechanization would need to be applied in all phases of production and harvesting.

STEPS TAKEN — We, therefore, organized teams of specialists composed of an agricultural economist, an agronomist, an entomologist and an agricultural engineer. We asked each County Agent in each of the major cotton-producing parishes to bring together the leading cotton producers of the parish, all of the agricultural workers who would be advising with the producers of cotton, and all primary processors and suppliers of production materials. These teams of specialists met with these groups, parish by parish, for a presentation of the best information available.

PARISH MEETINGS — Each Agent was encouraged to mobilize the help available in the parish and organize a team for meetings in all of the principal cotton-growing communities. In addition, each County Agent was asked to call together a few of the outstanding cotton producers, representatives of other agricultural agencies, personnel from nearby experiment stations and then agree upon ranges of recommendations for fertilizers, specific recommendations on varieties, planting dates, seedbed preparation and all other specific practices relating to cotton production, harvesting and marketing. This material was briefed to one page, mimeographed, and a copy was given to every agricultural worker, every ginner, merchant, seed and fertilizer salesman, or other person who would be contacting cotton farmers either with information or supplying them with materials necessary in cotton production.

Suggested news articles and suggested circular letters were prepared for the use of County Agents. Six such news items and six circular letters were prepared for the Agents during the early spring months of the year.

THE RESULTS — This approach did two things. It tied all cotton production information together into one package. It attempted to secure the co-operation of every individual who was contacting cotton farmers to the end that uniform recommendations would be made on cotton production and marketing practices. This effort was inaugurated and carried out during the early months of 1950 and similar or somewhat modified efforts have been repeated each year since. In addition, concentrated efforts were put forth to mobilize locally this same group of individuals for cotton insect control information when such efforts were timely in June or July. Special efforts were put forth on the harvesting and ginning of cotton to preserve its inherent quality at the time when this information was most applicable.

THE PICTURE TODAY — From information available to us these efforts have been partly successful. The use of plant food on cotton has more than doubled. The number of farmers requesting a soil analysis has more than doubled. Now, 90 percent of the cotton farmers of Louisiana grow one variety of cotton using seed not more than two years from registered seed. Tractors increased one-third from 1950 to 1953, mechanical pickers from 10 to 1,100 and other mechanical equipment in proportion. Our production of lint in 1956 was 496 pounds per acre.

We do not claim to have found a perfect answer to influencing cotton farmers to apply research findings to their operations. We do not claim that all or even a major portion of the cotton producers of Louisiana are following a complete program applying with judgment the best information that is known. We do believe that this united approach has enabled us to make progress.

FUTURE OUTLOOK — Although I am not directly associated with cotton production, it appears to me that we still have too many production failures. Cotton production is too hazardous. Last year we had some good cotton farmers who made considerably less than a bale of cotton to the acre. In some cases those men had applied to the best of their ability all of the information that was available.

In addition, I am convinced that our program has been too limited in its scope. If we are to obtain the 20-million-bale crop it may be necessary that we critically examine certain national policies which now govern many cotton operations. Much of the cotton economy is now governed by law. It is extremely difficult for us to discuss some of the issues involved without being accused of political interference. We have, therefore, refrained from an aggressive program. We have only answered requests for information for discussion purposes.

I have also observed that improvement in practices of handling cotton after it leaves the farm may not have kept pace with the improvement which farmers have made in their operations. Within the last month I walked through a cotton warehouse, and I saw the same slovenly cut, patched, dirty and unattractive bales which I saw 35 years ago. Farmers today accept rather readily improvement in the practices related to cotton production. In marketing it is a different story.

We need the stimulus which can come from an economy producing 20 million bales of cotton on farms that are permanently productive, prosperous and free. We need to face squarely every problem that may prevent the accomplishment of such a worthwhile objective.

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• Glidden Will Make Edible Protein

GLIDDEN CO. will build a new $4 million plant to make edible protein, a soybean derivative, at Indianapolis, Dwight P. Joyce, chairman and president, announces. Construction of the new facility will begin immediately.

"The new plant will make a major contribution to better human nutrition through the production of concentrated edible proteins, latest research achievement of the company's chemurgy division," he said.

The new protein product will be marketed under the registered trademark Promine. When incorporated in staple foods, Promine builds up protein levels to considerable higher nutritive standards and imparts many desirable physical characteristics to such products, Joyce said.

Already used in a wide range of food products, Promine has been available in limited quantities for the past three years. It promises a wide variety of uses in bakery products, all types of breakfast foods, baby foods, desserts, and scores of other food items, the company said.

The new plant will be operated by Glidden's Chicago-based chemurgy division. The division operates a three-million-bushel grain elevator and soybean processing plant in Indianapolis, as well as two large elevators and processing plant in Chicago.

■ **J. B. SNELL, Minden (Louisiana) Cotton Oil & Ice Co., was one of the hosts at the luncheon during the 1957 Beltwide Cotton Mechanization Conference, and attended a number of the sessions.**

3 High Yielding Cottons for Mechanization . . .

Developed by Stoneville—Proven Best

Delfos 9169 . . . Big open bolls . . . cleans up better on the stalk . . . *for good mechanical picking.*

Stoneville 3202 . . . Uniformly early . . . stays in the boll . . . *for good mechanical picking.*

Stoneville #7 . . . Upright plant . . . carries heavy load well off the ground . . . *for good mechanical picking.*

For Extra Staple

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High yield and extra staple has made Delfos 9169 one of the belt's leading cottons.

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Early maturity plus high yields make Stoneville 3202 increasingly popular, year after year.

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Exceptionally heavy production, high gin turn-out and new stalk make Stoneville #7 the most talked about cotton today

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• George S. Buck, Jr. Named by Council

GEORGE S. BUCK, JR., Washington, has been assigned to a newly-established research post in the National Cotton Council. He will be technical research assistant to Executive Vice-President Wm. Rhea Blake, and will have his headquarters in Memphis. He will provide technical research assistance to the Council's management.

Production and Marketing Director Claude L. Welch, Utilization Research Director Leonard Smith, and Buck will constitute a team which will have overall staff responsibility for technical research planning and development.

Mr. and Mrs. Buck and their three children will be making their home in Memphis after Nov. 15.

"Cotton Is Big Business" Article Points Out

"Cotton Is Big Business," is the title of an article in the September-October issue of Louisiana State University's "Alumni News," which explains that in Louisiana cotton is responsible for more than one-third of the total cash farm income.

The article goes on to outline the ways in which the three branches of LSU College of Agriculture are aiding the farmer win the battle against high production costs, insect damage and marketing problems.

Work being done by the research, extension and resident teaching staffs all are helping cotton to keep the royal title of "King" in the Southern States.

Advances in Manufacturing Of Cotton Shown

Advances being made in the manufacture of cotton were shown in a kit of cotton textiles provided by the National Cotton Council when the Rosedale Farm Bureau Center of Bakersfield, Calif., met Oct. 9.

Evelyn Pohl of Wasco, Miss Kern County, was guest of the Center and modeled part of her cotton wardrobe.

Mr. and Mrs. John Jelmini and Mr. and Mrs. Don Miller were in charge.

Georgia Textile Executives Hold Annual Meeting

Approximately 200 Georgia textile executives and their guests attended the sixteenth annual meeting of the Textile Education Foundation at Georgia Tech, Oct. 19, according to T. H. Forbes, Atlanta, secretary.

The business session, highlighted by an address by Georgia Tech's new president, Dr. Edwin Harrison, was held at W. Harrison Hightower Building, in which is located Tech's A. French Textile School.

Officers of the Foundation, in addition to Forbes, are: B. W. Whorton, LaGrange, president; John P. Baum, Millegeville, vice-president, and Henry W. Swift, Columbus, treasurer.

■ **CHARLES A. WOODLEY has been elected executive vice-president of Caterpillar Tractor Co. of Peoria, Ill.**

South Plains Leaders Plan Contest

SOME MEMBERS of the South Plains Maid of Cotton Committee are shown here as they met Oct. 7 at Lubbock to complete plans for the contest finals, Nov. 18-19. Breakfasts, luncheons, and a Cotton Ball at Lubbock Country Club will be among highlights of the event. Seated, l. to r., in the picture are: Dean Florence Phillips, Texas Tech; Duncan Ellison, Station KDUB; Robert Snyder, Station KCBD; George Brassell, Jr., general chairman and manager of Western Cottonoil Co., Lubbock; Conrad Lohoefer, Plains Cotton Growers, Inc.; Mrs. John Robert Moxley, Junior Welfare League; and Dean James G. Allen, Texas Tech. Standing are Wayne Prather, West Texas Compress and Warehouse Co.; Dixon White, Lubbock Cotton Oil Co.; John I. Bowling, cotton man; Rufus Grisham, Western Cottonoil Co.; Roy Forkner, president of Texas Cotton Ginners' Association; and Roy B. Davis, Plains Cooperative Oil Mill. Other committee members were not present when the picture was made.

• Cloud Seeding Shows Good Results

A FOUR-YEAR cloud seeding program, which has increased rainfall in western Kern County, Calif., by an estimated 60 percent, is beginning to attract statewide attention. San Luis Obispo County Farm Adviser Curtis Berryman has urged a thorough test of the possibilities of the operation.

The average for the four seeded years in Middlewater area from 1953 to 1957, was 4.98 inches, or exactly .70 inches more than was reported in Bakersfield, the non-seeded control area.

During a 20-year non-seeded period, the Bakersfield gauge showed an average precipitation of 6.79 annually, while Middlewater averaged about 4.96, or 73 percent of the Bakersfield amount.

The cost of seeding over the 40-mile area totaled about $35,000, or three and one-half cents an acre. This cost would place the cost of the rainfall at about 11 to 14 cents an acre foot for the additional water, a fraction of what irrigation by any other known method would cost.

■ **W. F. BOWLD, JR., formerly with Buckeye at Memphis, now is assistant zone manager for P&G at Geneva, Switzerland.**

Feed Manufacturers Announce Program

American Feed Manufacturers' Association has announced a three-point attack on feed industry economic problems.

The program includes: Addition of an experienced economist as a new full-time staff member to conduct market research and economic studies; re-emphasis of the livestock feed booking policy and issuance of new recommendations for credit and finance practices.

Mexican Textile Industry Losing Ground

The Mexican cotton textile industry has lost ground steadily in the international market in recent years.

The National Bank of Foreign Commerce says it needs a face lifting with modern equipment and should expand the internal market further. Exports of sisal products also have fallen, and production is off in the woolen industry. But synthetic fiber mills constantly have increased production, the private bank says in its trade publication.

The drop in foreign sales of cotton goods has been drastic. Sales increased during World War II and reached a peak in 1951, when 60 countries bought nearly $19 million worth. The demand dwindled until last year Mexico sold just under $7 million to 33 countries, the bank report said. This was a reduction in value of 63.4 percent in five years.

Mexico's consumption of cotton goods now is small in comparison with other countries, "which means there exists a possibility to improve our consumption . . . and initiate an efficient publicity campaign," the bank commented.

Cooperatives Borrow More

Farmer cooperatives borrowed $580 million from 13 banks for cooperatives in the fiscal year ended June 30. USDA says this was three percent more than in the previous year.

Textile Meeting Set

Alabama Textile Manufacturers' Association will hold its 1958 meeting at Biloxi, Miss., April 16-18. E. R. Lehmann, West Point Manufacturing Co., meeting committee chairman, says the Buena Vista Hotel will be headquarters.

• Soybean Cyst Nematode Quarantines Listed

As of Oct. 10, Arkansas, Kentucky and Mississippi have been added to states quarantined by USDA because of the presence of the soybean cyst nematode, according to announcement by USDA.

Areas to be regulated in the three states will be limited to localities infested or likely to be infested with the pest. These comprise the Delta land between the Mississippi River levee and the adjoining state lines in Crittenden and Mississippi Counties, Ark. and DeSoto County, Miss., plus an individual farm each in Mississippi County, Ark. and Fulton County, Ky.

Quarantine regulations provide that certain products and articles which might harbor the soybean cyst nematode may move from infested areas only under certification or permit issued by USDA. Most regulated products and articles are allowed movement after inspection or treatment, or under other conditions of handling or sanitary practices that make them safe for movement.

The regulations apply to interstate movement of live soybean cyst nematodes, soil, nursery stock and other plants with roots attached, root crops, bulbs, ear corn, soybeans, small grains, hay, straw, fodder, and plant litter of any kind, seed cotton, used construction and maintenance equipment, used sacks and other containers for farm products, and other machinery, vehicles and farm products that might spread the pest.

Southern Farm Families Big Biscuit Eaters

Southern farm families eat more hot biscuits and other home baked foods than do families in any other section of the country, according to a household food consumption survey just completed by the USDA.

Southern farm families use more flour, fats, sugar, soups, dry beans and peas and more fresh vegetables than families of any other area, but less meat, potatoes, fresh fruit and commercially-processed fruit and vegetables.

Southern families used 2.8 pounds of cornmeal and grits in a week against the nation's average of less than a pound. Farm families in the South averaged 5.8 pounds a week of cornmeal and grits.

Bushel Wins Over Hundredweight

The bushel will continue as the measure for grain and feed trading for sometime to come, USDA has indicated. Feed industry leaders have advocated changing to the pound measure, but many in the grain trade oppose this proposal. Commodity Credit Corporation has announced that it will continue to use the bushel in 1958 grain operations, but that study of the possibility of a change later is continuing.

Gin-Soaked Rice Solving Chinese Farm Problem

Chinese farmers have solved one problem, even though they still face famine and other agricultural adversities. A novel method of catching the sparrows that beset Chinese farms is reported: Soak rice in gin and scatter it around the farm. When the birds pounce on the morsels they become so groggy the peasants can bag them with their bare hands.

New Textile Mill Machinery Made Available

A new machine for cotton textile mills, combining superior bale-opening and blending abilities with outstanding efficiency in cotton cleaning, has been developed by cotton-utilization specialists of the USDA.

The principle of the SRRL Opener-Cleaner is covered by patents and is available for license from the Secretary of Agriculture on a royalty-free, nonexclusive basis. Copies of the patent may be obtained from the U.S. Patent Office. Engineering drawings and technical specifications for the machine may be obtained by licensees, without cost, from Southern Utilization Research and Development Division, P. O. Box 7307, New Orleans, 19.

The machine was designed by Ralph A. Rusca and Ray C. Young at USDA's Southern Utilization Research and Development Division in New Orleans. It retains all the advantages of the earlier SRRL Cotton Opener, invented by Rusca and Young, which has had wide acceptance by the industry.

USDA Joins Clemson In Cotton Research

A new research program to study the effects of various synthetic-resin and rubber-latex emulsions upon cotton has been established by USDA—ARS and Clemson Agricultural College School of Textiles, where the work will be done.

This is part of a continuing program to develop new uses for cotton and to make cotton fabrics more suitable for present uses. Many resinous and rubber-latex compounds are now commercially available. Although some of them are already being used to treat cotton, their full possibilities have not yet been explored. In this Clemson study, selected compounds will be used to see if they will impart desirable new qualities to cotton.

Preliminary analysis shows that some compounds can improve cotton's resistance to water, abrasion, weathering and soiling. Tenting, tarpaulins, and rainwear and other cotton clothing may benefit from such improvement.

James H. Langston, professor of textile chemistry and dyeing at Clemson, and Carl Hamalainen, the cotton chemical section at USDA's New Orleans Laboratory, will direct the research.

■ **CECIL BRIDGES is managing Paymaster Gin at Lubbock.**

U.S. Farm Products Make Big Hit in Germany

The exhibit of U.S. farm products at the Cologne, Germany, Fine Foods Fair, Sept. 28 through Oct. 6, broadened and strengthened contacts between German buyers and American exporters of U.S. farm products, USDA reported.

Significance of the promotion is indicated by the fact that Germany in the fiscal year 1957, was the third largest customer for American farm products.

German official interest in the exhibit was evident. Dr. Heinrich Luebke, German Minister of Food, Agriculture and Forestry, twice visited the U.S. pavilion and asked many questions about American farm products. He expressed appreciation for the German people's opportunity to see U.S. frozen and other specially prepared time-saving foods which are little known in Germany.

Visitors in general expressed keen interest in American methods of cooking, packaging and marketing.

Meal and Salt Flakes Popular in Arizona

Cottonseed meal and salt flakes, produced by Western Cottonoil Co., are proving popular with range cattlemen in Arizona. A feature article on the feed appeared recently in Arizona Farmer-Ranchman.

Most cattlemen prefer 33 percent salt and 67 percent meal, Tom Rollow of Western Cottonoil reports, although the firm also makes a 25 percent salt mixture. The flaked form was developed, at the request of cattlemen, to avoid the blowing and loss in the use of the popular meal and salt mixtures.

■ **H. B. COOKE, general traffic manager, Humko, Memphis, has retired and has been succeeded by EVERETT MOORE. COOKE will continue as a traffic consultant, opening his own office.**

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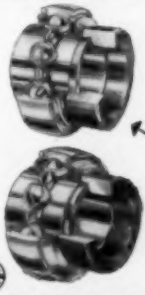

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Why Fishing Is My Hobby

By W. L. Griffin

W. L. Griffin, manager of the Deming Gin, Inc., Deming, N.M., is president of New Mexico Cotton Ginners' Association. Fishing began at an early age for the author, this photo will show. Maybe its just a "fish-story," but we hear that the catches have been improving over the years, along with the author's skill and enthusiasm.

WEBSTER defines a hobby as "an engrossing plan or topic to which one constantly reverts; also, an occupation or interest to which one gives his spare time." And he goes on to say that there is a sort of calling involved in a hobby. Just as a man through his various senses is called to an occupation which becomes his vocation, he is also called away from his ordinary pursuits into these minor occupations which we call avocations. A man's favorite avocation, or the one toward which he is most strongly drown by his senses, becomes his hobby.

Now I have many avocations. (My wife says *too* many). But I confess that the reason that I participate in most of them is simply because I am looking for some excuse to get out of working. But fishing is my hobby. It is the only avocation toward which I actually feel drawn by some invisible power within my senses beyond my natural inclination away from work.

There are several reasons why fishing appeals to me so much. First, a lot of the appeal is hereditary. Fishing has always been the hobby of my dad and mother. I grew up following my grandfather down a drain ditch bank with a cane pole in one hand and a can of worms in the other back in the depression days of the early 1930's in Mesilla Valley; graduated to a rod and reel in company with my parents during the late '30's and early '40's on Elephant Butte Lake; got in a little deep sea fishing in recent years on the Gulf of California; and have done some stream fishing for trout with fly rod and waders just lately. And I shouldn't leave out cat fishing with trot lines in both the Rio Grande and Elephant Butte Lake, or grappling for the big catfish by hand in the Rio after the irrigation gates had been closed for the season back in my high school days.

It's hard to clearly define the peculiar thrill that comes from fishing. I know it doesn't come from the number of fish you catch, because I have had that thrill on a lot of days when the catches were very small. Part of it, I guess, is expectancy. Certainly every fisherman spends more time expecting than catching.

It isn't the size of the fish. I've had many thrills from little blue gills as well as from larger species.

Probably it is a combination of many things. The out-of-doors; the continual expectancy; the contest pitting man against fish both in wits and physical strength; of course, the aftermath, which is comparable in every way to golf's nineteenth hole; the companionship and fellowship of others afflicted with this strange disease known as fisherman's fever; and the fact that there are so many different ways in which one can fish, varying from the inexpensive hook, line, and sinker on a willow pole, all the way up to the fabulous deep sea fishing outfits.

I heard a friend pretty well sum up this attitude toward fishing recently when he said, "I can go out on that lake really loaded down with the troubles of the world. Taxes, debts, inflation, moral degeneration, threats from atomic war, and all the others we read and hear about daily. But when I get out there in my boat, cast a plug near a good looking bush, start in, and have a big mouth bass take it and start west, brother, my troubles go right off the end of that rod into the water, and I get to work on the problem at hand."

Maybe that's what a lot of us need today. Some small problems that we can work out for ourselves.

Lint Quality and Moisture

(Continued from Page 7)

conditions contained an average of almost two percent more foreign matter than the bales that were picked in the morning, 8.0 percent for the afternoon-picked bales and 6.3 percent for the morning-picked bales (Table 2).

The afternoon-picked bales were dried to a lower moisture content and therefore received better cleaning in the gin. The average seed cotton foreign matter content of the afternoon-picked bales, after seed cotton cleaning, was 2.05 percent, as compared to 2.36 for the morning-picked bales. The lint foreign matter content for the morning-picked bales averaged 6.82 percent, as compared to 6.07 for the afternoon-picked bales, an average difference of less than one percent.

Grades for the afternoon-picked cotton averaged almost a full grade higher than for the morning-picked lots (Table 3). The loss of color associated with delay in ginning of high moisture seed cotton accounts for a large part of grade differences between the morning- and afternoon-picking treatments. The average per bale value under test conditions with gin yard storage was approximately $12.41 more for the afternoon-picked lots than for morning-picking, based on a price of 34 cents per pound.

There was no significant difference in average staple length of the morning- and afternoon-pickings, but time of picking indirectly affected some of the fiber properties. Actual effect appears to be due to moisture content at the time of ginning. The afternoon-picked bales, lowest in lint moisture, showed a lower mean length, a lower upper half mean length, and a lower uniformity index than the morning-picked bales.

HEADQUARTERS FOR COTTON ACTIVITIES IN LUBBOCK
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Superintendents Plan Two Conventions

International Oil Mill Superintendents' Association has set the dates for two 1958 meetings, according to H. E. Wilson, Wharton, Texas, secretary-treasurer.

West Coast Division will hold its eleventh annual meeting at the Lafayette Hotel in Long Beach, Calif., March 7-9.

The sixty-fourth annual convention of the International Association is scheduled for June 8-10 at the Baker Hotel in Dallas.

The Mexican Division will hold its annual meeting at Matamoros, but the dates and headquarters have not been selected.

Mill Adds Seed House

Ranchers Cotton Oil Co., Fresno, Calif., has a new cottonseed house holding 17,000 tons. Earl J. Cecil, general manager, says the $100,000 project will give the oil mill a total storage capacity of 73,000 tons.

Ginner at Ralls Dies

Russell Forbes, Ralls, Texas, died Oct. 9. He had been a resident of the South Plains and ginner since 1921. Survivors include his wife, two sons and five daughters.

■ **ROBERT F. PATTERSON, Trenton, Tenn., has been appointed to the NCPA charter and by-laws committee, succeeding R. M. HUGHES. A. L. DURAND, Hobart, Okla., has been named chairman; and W. B. COBERLY, Los Angeles, is the other committee member.**

Ginnings to Oct. 1

The Bureau of Census reports 1957-crop ginnings prior to Oct. 1, compared with 1956 and 1955, as follows:

State	Ginnings (Running bales—linters not included)		
	1957	1956	1955
United States	*2,498,552	*5,523,648	*4,804,195
Alabama	277,385	437,182	582,458
Arizona	68,615	104,711	69,427
Arkansas	153,632	623,816	438,537
California	54,264	53,152	28,871
Florida	6,037	8,068	13,916
Georgia	278,473	376,204	432,276
Illinois	80	418	109
Kentucky	576	2,641	1,504
Louisiana	96,634	374,156	256,063
Mississippi	302,029	913,091	761,689
Missouri	20,852	223,791	106,917
New Mexico	13,548	38,300	13,256
North Carolina	74,205	115,446	101,241
Oklahoma	9,147	78,030	50,700
South Carolina	209,817	281,175	326,630
Tennessee	70,946	259,461	107,651
Texas	860,436	1,631,551	1,511,938
Virginia	1,876	2,455	1,012

*Includes 230,756 bales of the crop of 1957 ginned prior to Aug. 1 counted in the supply for the season of 1956-1957, compared with 404,845 and 313,958 bales of the crops of 1956 and 1955.

These statistics include 1,443 bales of American-Egyptian for 1957, 1,584 for 1956, and 464 for 1955.

CONSUMPTION, STOCKS, IMPORTS, EXPORTS

Cotton consumed during August, 1957, amounted to 666,549 bales. Cotton on hand in consuming establishments on Aug. 31, 1957, was 993,041 bales and in public storage and at compresses 9,326,845 bales. Active consuming cotton spindles for the month totaled 18,019,000. Total imports for July, 1957, were 6,300 bales and the exports of domestic cotton, excluding linters, were 417,607 bales.

October Cotton Report

USDA estimates the 1957 cotton crop, on Oct. 1, at 12,401,000 bales. The reduction of 312,000 bales from a month earlier results from decreases in the Midsouth and Southeast which more than offset increases in the Southwest. The indicated yield per acre dropped 11 pounds from the September forecast to 435 pounds, but continues above the previous 1955 high of 417 pounds.

Cottonseed production is indicated at 5,103,000 tons. This compares with 5,423,000 last season.

Reports by states follow:

State	Acreage for harvest 1957[1]	October 1 condition			Lint yield per harvested acre			Production[2] 500-lb. gross wt. bales		
		1946-55 av.	1956	1957	1946-55 av.	1956	1957 indic.	1946-55 average	1956	1957 indic.
	Thousand acres	Percent			Pounds			Thousand bales		
North Carolina	355	71	83	70	320	391	338	449	359	250
South Carolina	500	69	75	70	305	360	336	647	513	350
Georgia	578	69	73	73	264	334	345	679	579	415
Tennessee	475	74	82	76	374	488	455	579	552	450
Alabama	740	71	72	70	296	370	357	891	750	550
Mississippi	1,350	73	81	74	363	493	498	1,702	1,609	1,400
Missouri	307	76	90	64	384	586	391	385	448	250
Arkansas	1,135	71	79	78	360	500	543	1,444	1,426	1,285
Louisiana	455	72	83	64	357	496	422	606	581	400
Oklahoma	575	59	46	75	170	175	275	374	261	330
Texas	5,925	70	68	83	208	280	332	3,742	3,615	4,100
New Mexico	181	89	94	89	551	797	756	253	301	285
Arizona	350	91	95	91	718	1,108	1,138	620	829	830
California	716	92	96	96	683	924	989	1,249	1,446	1,475
Other States[3]	44	—	—	—	295	341	333	49	41	31
United States	13,686	73	77	80	300	409	435	13,669	13,310	12,401
Amer.-Egypt[4]	81.0	—	—	—	408	583	548	36.8	50.3	92.5

[1] September 1 estimate. [2] Production ginned and to be ginned. A 500-lb. bale contains about 480 net pounds of lint. [3] Virginia, Florida, Illinois, Kansas, Kentucky, and Nevada. [4] Included in state and U.S. totals. Grown in Texas, New Mexico, Arizona, and California.

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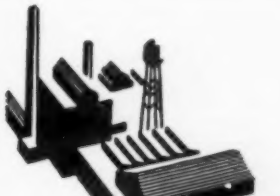

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INSPECTIONS and appraisal. Dismantle and installation.—Oscar V. Shultz, Industrial Engineering, Phone BUtler 9-2172, P. O. Box 357, Grapevine, Texas.

FOR SALE—Anderson Super Duo expellers. Filter presses. 72" and 85" cookers. Butters milling machine. Carver 176-saw Tru-line Gummer. Double box linter press. Attrition mills. Single drum hull beater. 20" to 70" fans. Motors: 75 h.p. and under.—Sproles & Cook Machinery Co., 159 Howell St., Telephone RI7-5958, Dallas, Texas.

FOR SALE—Anderson Duplex Super Duo 36" cooker twin motor expellers, 42" and 36" filter presses, oil refining equipment, oil screening tank, five-high cracking rolls, scale tanks complete with Toledo scales, Richardson scales, meal coolers, Prater pulverizers, pumps and motors. All in A-1 condition. Contact Lee Atherton of Archer Daniels Midland Co., Minneapolis, Minnesota.

OIL MILL EQUIPMENT FOR SALE — Rebuilt twin motor Anderson high speed expellers, French screw presses, stack cookers, meal coolers, fourteen inch conditioners, filter presses, oil screening tanks, complete modern prepressing or single press expeller mills.—Pittock & Associates, Glen Riddle, Pa.

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100	Slipring	900		1189
100	Sq. Cage	1200		758
100	Sq. Cage	900		879
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FOR SALE—3-90 saw Continental brush gins, perfection extractors, 72" impact cleaners, individual lint cleaners, 24-shelf tower, 2 Munger cleaner separators, oil fired heater, scales, Roots-Connersville rotary seed blower and cyclone with 5" pipe and pure seed drag belt, gins and change bale valves have automatic push button control, up-packing steel press and building to be moved or without building. Machinery purchased NEW in '55. Reason for selling—no cotton. Practically brand new, the model has not changed. Why pay more? Contact Box XYZ, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

FOR SALE—Complete cotton gin plants. Second hand and reconditioned gin machinery.—Sam Clements Company, Inc., Phones REgent 5-3656 and REgent 5-3764, West Memphis, Ark.

WE HAVE bought a Continental DFB lint cleaner and have a practically new Continental condenser for sale, reasonable.—Farmers Coop Gin, Royce City, Texas.

FOR SALE—Complete 4-80 saw air blast Model C gins, all-steel up-packing paragon press, E.J. tramper, triplex pump base tank and cover, all Continental. Press alone worth the price of the outfit—$7,500.—James C. Mann, phone 2267, Covington, Ga.

FOR SALE—Complete gin with power and scales operated 1956 as follows: 6-cylinder steel Stacy airline, Hardwicke-Etter flat screen separator, 12-shelf tower dryer, wood 7-cylinder Hardwicke-Etter precleaner, 14' extractor, 7-cylinder after-cleaner, Mitchell FEC, 4 Continental brush gins, 60" steel Continental condenser, wood up-packing press, MM 6-cylinder gas engine, 22' 12 ton scale. This outfit complete with fans, heater. Ironclad frame building and automatic sprinkler system optional. Contact Jack B. Jamison, Jamison Gin, 802 2nd St., Wichita Falls, Texas.

FOR SALE—Several choice buys in West Texas gins.—M. M. Phillips, Phone TE 5-8555, Box 7385, Corpus Christi, Texas.

FOR SALE—Gin stands: 5-80 saw Murrays with glass fronts, 6" mote conveyor, new gin ribs and huller ribs. 4-80 saw double moting automatic Lummus. Lint cleaners: 5 Continentals with by-pass valves, Hartzell fans and motors. 5 Murray A.B.C.'s—like new. 5 Murray saw type. Feeders: 5-67" Continental 4-X. 4 Hardwicke-Etter 66" with 4-cylinder after-cleaners. 5-60" Super Mitchells. Driers: One 4-trough Continental. One No. 18 Murray Big Reel. Burners: One 1½-million BTU Hardwicke-Etter. Fans: One No. 45 cast iron Boardman.—Kimbell Used Gin Machinery Co., Box 456, Earth, Texas.

SPECIAL BARGAINS—All steel double box up-packing Hardwicke-Etter press. One 15', 9" rotor lift, like new. Late model 4-90 Mitchell conveyor distributor. Steel cleaners: 6-cylinder Stacy, 7-cylinder 50" Hardwicke-Etter V-belt driven, 4-cylinder Continental, two Mitchell Jembos and 8' Lummus 4-cylinder after-cleaner. Five Murray saw type lint cleaners. Mitchell convertible and Super units in 60" and 66" lengths. Two trough Continental and Murray Big Reel driers. New tower driers in any size. 10' and 14' Lummus steel bur machines. Late model fully enclosed medium stroke Murray steel tramper. 48" type M and type C Lummus, 50" and 70" Hardwicke-Etter and two 52" Murray VS steel separators. One Hardwicke-Etter Hi-Duty 4-plunger hydraulic press pump mounted on steel fluid tank with automatic lubrication, safety valves and back gear driven with V-drive to 15 h.p. electric motor, all like new. New and used single and double fans, belting, conveyor trough and a general line of transmission equipment. For your largest, oldest and most reliable source of used and reconditioned gin machinery, contact us. Call us regarding any machinery or complete gin plants which you have for sale or trade.—R. B. Strickland & Co., 13-A Hackberry St., Phones: Day PL-2-8141, Night: PL-3-7929, Waco, Texas.

First Mississippi Pink Bollworm

Mississippi's first pink bollworm, found in Walthall County, brought immediate quarantine regulations to prevent untreated cottonseed or okra from leaving the area. It is believed that the moths were blown into the state by Hurricane Audrey.

FOR SALE—One complete 5-80 Lummus automatic gin, very good condition, with 18' tower drier, electric power. Will sell all or separate. Reasonable. Selling due to health.—Kollaja Gin Co., Box 273, Ganado, Texas.

FOR SALE—4-90 Murray gin complete, 1952 model, to be moved. In good condition. Asking $40,000. Will negotiate.—Box NW, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

Equipment Wanted

WANTED—Complete cotton gin plants and used gin machinery.—Sam Clements Company, Inc., West Memphis, Arkansas.

WANTED—Two sets truck scales 22' x 8', 15 ton or more capacity. 52" Continental or Hardwicke-Etter separators.—Kimbell Used Gin Machinery Co., Phone 3372, P. O. Box 456, Earth, Texas.

WANTED—Delinting machinery, if possible complete plant with condensors, flue system, intake and discharge chutes, piping, tru-line gummer, cleaning machinery, etc. Delivery October or if still in operation, February after seasonal work. State lowest price, year of make, mechanical condition, etc.—Box BV, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

WANTED FOR EXPORT—Used mill for 150/250 tons oilseed. Also delinting equipment and hydrogenation plant. Write or wire Miltenberg & Samton, Inc., 10 E. 40th Street, New York, N.Y.

USED GIN EQUIPMENT BARGAINS

14' Murray Burr Machine	$4,000.00
7 Cylinder Incline Cleaner—Murray	1,500.00
72" Continental Separator	650.00
52⅝" Murray Separator, less vacuum	350.00
30" Murray Multi-blade Fan, C.I.	185.00
30" Continental Multi-blade Fan, C.I.	185.00
30" Claridge S. B. Fan, C.I.	160.00
30" Continental S. B. Fan, C.I.	160.00
D 35" Murray Fan, C.I., 8 blade and Multi-blade	500.00
45" Continental Fan, Multi-blade C.I.	310.00
Continental Vertical Press Pump	850.00
1M Mitchell Burner	240.00
2-M Mitchell Burner	680.00
#30 Vaporizer	230.00

POWER UNITS

25 h.p. 3 ph. 220/440 RPM Westinghouse	$ 275.00
10 h.p. 3 ph. 190 RPM Gear Head Motor	350.00
5 h.p. 3 ph. 220/440 1725 RPM Baldor	85.00
1 h.p. 3 ph. 1720 RPM General Electric	45.00
1 h.p. 3 ph. 220/440 Volt Wagner 1750 RPM	45.00
¾ h.p. 1 ph. Marathon	25.50
½ h.p. 3 ph. Peerless 1750 RPM 220/440	19.90
671 GMC, 130 h.p.	1,850.00
RX1 –100 h.p. Le Roi	900.00
5 h.p. International	35.00
Le Roi RX1SV 300 h.p. Engine	5,000.00

WONDER STATE MFG. CO.

Paragould, Ark.

Personnel Ads

WANTED—Year-around sober ginner, must be under thirty-five years, able to work men, use welding machine, some mechanical ability, be able to manage the business in one year.—Box E.J.S., The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

Power Units and Miscellaneous

FOR SALE—One 300 h.p., 700 RPM, 440 volt, 60 cycle, 3 phase, slipring electric motor in excellent condition.—R. W. Kimbell, Box 456, Earth, Texas.

FOR SALE—Rewound 125 h.p. Howell electric motor, 284 amp., 1725 RPM, squirrel cage type.—Mrs. Homer Camp, Boaz, Alabama.

FOR THE LARGEST STOCK of good, clean used gas or diesel engines in Texas, always see Stewart & Stevenson Services first. Contact your nearest branch.

SEE US for good used re-built engines, MM parts, belt lace, and Seal-Skin belt dressing.—Fort Worth Machinery Company, (Rear) 913 East Berry Street, Fort Worth, Texas.

George Stewart, Former Swift Official, Dies

George J. Stewart, Chicago, who retired from a Swift & Co. vice-presidency two years ago because of ill health, died Oct. 3. He is survived by his wife, two children and four grandchildren.

Stewart, 62 years old, was with Swift for 45 years before retirement, serving 25 years as an officer. He joined the firm as an office boy in 1911; served as assistant to G. F. Swift, who was vice-president, from 1926 to 1931. Stewart became a vice-president in 1931. His duties included supervision of oil mill and refinery operations, public relations and other Swift activities at various times. He served as a director and committee member for National Cottonseed Products Association.

Cotton Deadline Extended

The pink bollworm plow-up deadline for cotton stalks in Texas Zones 3 and 4 has been extended from Oct. 20 to Oct. 31, Texas Department of Agriculture announced Oct. 18.

Water Outlook Favorable

Water supplies for 1958 appear to be generally favorable in Western irrigated areas, USDA reports. The exception is southern parts of New Mexico, the Salt River Valley of Arizona and Southern California—all important cotton areas.

Rains Hamper Harvest, Lower Lint Grades

Rainy weather over much of the Cotton Belt slowed harvesting of an already-late cotton crop, and hurt quality of the fiber. The extent to which grades are lowered will largely depend, cotton leaders emphasized, upon how careful growers and ginners are to avoid improper harvesting and ginning of this cotton. "Spotted" cotton was causing complaints among growers in West Texas.

Ginnings continued to run below those a year ago, and USDA's October crop estimate was smaller than anticipated by most of the cotton trade. This report and the latest ginning report appear elsewhere in this issue.

Cleve Tandy, Texas Valley Cotton Leader, Dies

Cleve H. Tandy, cotton leader and chairman of the board of the Port Fertilizer and Chemical Co. of Los Fresnos, Texas, died at his home near Brownsville, Oct. 15. He was 62 years old.

He had been in ill health for some time but had continued to be active in business and civic affairs until his death.

Tandy is survived by his wife Evelyn; his brother Dave; and his daughter, Mrs. Doug Earley. His nephew, Clyde Tandy, Jr., and his son-in-law, Earley, are both active in the Port Fertilizer and Chemical Co.

Anderson, Clayton & Co. Builds Eight New Gins

Anderson, Clayton & Co. built six new gins in the U.S. and two in Mexico during the last fiscal year, the firm's annual report shows. Two other U.S. gins were purchased and several relocated.

As previously announced, Anderson, Clayton in the fiscal year ended July 31 had net sales and operating revenue of $894,408,001, and profit less minority interests of $15,507,724, or $4.76 a share. This compared with sales and operating revenue of $823,998,864, and profit of $12,441,241, or $3.82 a share, in the 1956 fiscal year.

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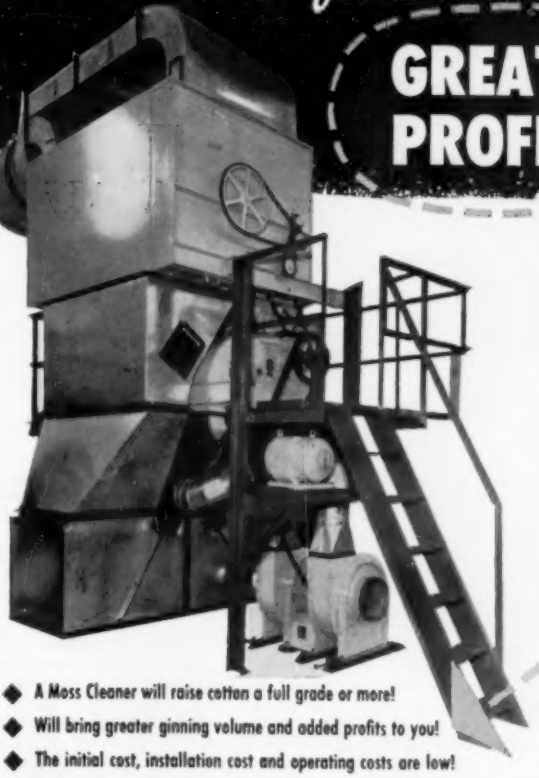

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(NOTE: Generally, cottonseed oil mill listings in the United States show officers, addresses, equipment and rail location. Many of the other vegetable oil mill listings in the United States, Canada and Latin America also give this information.)

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New Bulletin

IMPROVED COTTONSEED MEAL FOR BROILERS AND CHICKS

An important USDA publication on cottonseed meal for poultry has been sent to mills by Garlon A. Harper, Dallas, National Cottonseed Products Association Research and Educational Division director.

A special report of the Agricultural Research Service, "Improved Cottonseed Meal for Broiler and Chick Rations" is based on information provided by the Southern Utilization and Research Division, New Orleans.

USDA, NCPA and many oil mills and state research institutions are cooperating in processing and nutritional research to widen the use of cottonseed meal in rations for swine and poultry. Progress made to date and future needs are reviewed in this publication.

Soybeans Listed as Surplus

Soybeans have been added, and flaxseed removed, from the list of crops designated as surplus on land leased from the government. Any of the 12 designated crops produced in violation of leases will not be eligible for price supports. Cotton and peanuts are included in the list.

Statement of the Ownership, Management, and Circulation

required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233), of The Cotton Gin and Oil Mill Press, published bi-weekly at Dallas, Texas, for October 1, 1957.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, R. Haughton, Dallas, Texas.
Editor, Walter B. Moore, Dallas, Texas.
Managing Editor, Dick Haughton, Jr., Dallas, Texas.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Haughton Publishing Company, 3116 Commerce St., Dallas, Texas:
R. Haughton, Dallas, Texas.
R. Haughton, Jr., Dallas, Texas.
Ben W. Haughton, Dallas, Texas.
Mrs. R. Haughton, Dallas, Texas.
Mrs. Jennie L. Haughton, Dallas, Texas.
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B. P. Ridgway, Dallas, Texas.
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I. J. Campbell, Dallas, Texas.
Ruth Justiss, Dallas, Texas.
Earl B. Myrick, McKinney, Texas.
Glenn Copeland, Dallas, Texas.
Walter B. Moore, Dallas, Texas.
M. E. Griffin, Dallas, Texas.
A. M. Dickson, Garland, Texas.
Lester Huddleston, Dallas, Texas.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

(Signed) DICK HAUGHTON, JR.

Sworn to and subscribed before me this 1st day of October, 1957.

(Seal) M. E. GRIFFIN.

(My commission expires June 1, 1959.)

• Advisory Committee On Cotton Meets

MEMBERS of USDA's Cotton and Cottonseed Advisory Committee visited cotton industry centers of California's San Joaquin Valley during their fall meeting, Oct. 14-16.

Twenty representatives of all parts of the Cotton Belt make up the committee.

Visits were made to W. B. Camp & Sons Farms, Kingsburg Cotton Oil Co., Richland Cooperative Gin, U.S. Cotton Field Station, Calcot, Ltd., San Joaquin Cotton Oil Co. and other points around Fresno and Bakersfield.

New Firm To Distribute Seed of Rex Variety

E. D. McKnight, Sr., partner, St. Francis Valley Pedigreed Seed Co., Parkin, Ark., is president of a newly-formed corporation, Rex Seed, Inc. The new company will act as an increasing and sales organization for Rex cottonseed, a new cotton.

Developed by the University of Arkansas, Rex will be distributed commercially for the first time in 1958.

A cross between an inbred line and Empire WR, Rex is an early-maturing, good-yielding variety that is resistant to both bacterial blight (angular leaf spot) and fusarium wilt. The new strain has created interest because of its large bolls, competitive staple length, high gin turn-out, and resistance to storm loss during the three-year test period.

Ginning Engineering Students Busy

FIFTEEN SENIOR STUDENTS at Texas Technological College have been busy this fall taking the new course in cotton ginning engineering. They are shown here during their first laboratory—a visit to a new cotton gin west of Lubbock. Their second laboratory consisted of a trip to the State Fair in Dallas and visits to The Murray Co. and the John E. Mitchell Co. plants. Shown in the picture, left to right, standing, are: Ira L. Williams, Texas Tech agricultural engineering department head; Bill Rainey, sales engineer, The Murray Co.; and students, David Franklin, Seagraves; A. H. McIlwain, Hale Center; Ivan Kirk, Groom; Kenneth Billington, Tulia; Ted Brown, Dublin; William Laceky, Beaumont. Kneeling, Wesley Cagle, Plainview; Donald Denton, Big Spring; Royce Brooks, Sadler; Richard Ochs, Dumas; Lewis Hodgin, Roaring Springs; Wendell Moody (hidden), Eden; Roy Johnson, Amarillo; Douglas Rattan, Pecos; and Beade Northcut, Pecos.

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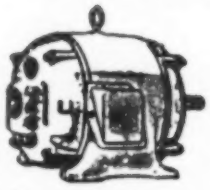

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CALENDAR

Conventions - Meetings - Events

12	13	14	15	16	17	18

- Dec. 7 — Tri-States Oil Mill Superintendents' Association regional meeting. Memphis. W. E. Hassler, Buckeye Cellulose Corp., Memphis, chairman.

- Dec. 12-13 — Beltwide Cotton Production Conference. Peabody Hotel, Memphis. For information, write National Cotton Council, P. O. Box 9905, Memphis.

1958

- Jan. 13-14—National Cotton Council annual meeting. Westward Ho Hotel, Pheonix, Ariz. For information, write Council headquarters, P.O. Box 9905, Memphis.

- Jan. 21—Cooperative Ginners' Association of Oklahoma annual convention. American Legion Building, Hobart. Mrs. Lucile Millwee, P. O. Box 631, Carnegie, secretary-treasurer.

- Feb. 3-4—Cottonseed Processing Clinic. Southern Regional Laboratory, New Orleans. Sponsored by USDA and Valley Oilseed Processors' Association. C. E. Garner, 416 Exchange Building, Memphis, Association secretary.

- Feb. 10-11—Annual joint convention, Texas Cooperative Ginners' Association, Texas Federation of Cooperatives and Houston Bank for Cooperatives. Baker Hotel, Dallas. For information, write Bruno E. Schroeder, 307 Nash Building, Austin.

- Feb. 10-11 — Southeastern Gin Suppliers' Exhibit. Biltmore Hotel, Atlanta. For exhibit information, write Tom Murray, 714 Henry Grady Building, Atlanta. Concurrent with joint meeting of Alabama-Florida, Carolinas and Georgia Cotton Ginners' Associations.

- Feb. 10-11 — Joint convention, Alabama-Florida, Carolinas and Georgia Cotton Ginners' Associations. Biltmore Hotel, Atlanta. Tom Murray, 714 Henry Grady Building, Atlanta, executive vice-president, Alabama-Florida and Georgia Associations. E. O. McMahan, Bennettsville, S.C., executive secretary, Carolinas Ginners' Association. Meeting concurrent with Southeastern Gin Suppliers' Exhibit.

- Feb. 12-14—Cotton Research Clinic. Pinehurst, N.C. For information, write the National Cotton Council, P. O. Box 9905, Memphis 12.

- Feb. 27-28—Oklahoma Cotton Ginners' Association annual convention. Skirvin Hotel, Oklahoma City. Edgar L. McVicker, 307 Bettes Building, Oklahoma City, secretary-treasurer

- March 4-5—Western Cotton Production Conference. Hotel Cortez, El Paso, Texas. Sponsored by Five-State Cotton Growers' Association and National Cotton Council.

- March 7-9—West Coast Division, International Oil Mill Superintendents' Association. Lafayette Hotel, Long Beach, Calif.

- March 10-12 — Midsouth Gin Supply Exhibit. Midsouth Fairgrounds, Memphis. Sponsored by Arkansas-Missouri

Ginners' Association, Tennessee Ginners' Association and Louisiana-Mississippi Ginners' Association, which will have annual meetings in conjunction with Exhibit. For information on exhibit, write W. Kemper Bruton, P. O. Box 345, Blytheville, Ark.

• March 10-12 — Joint convention, Arkansas-Missouri, Tennessee and Louisiana-Mississippi Ginners' Associations. Memphis, Tenn. Held in conjunction with Midsouth Gin Supply Exhibit. W. Kemper Bruton, Blytheville, Ark., executive for Arkansas-Missouri Association; Gordon W. Marks, Jackson, Miss., executive for Louisiana-Mississippi Association; and W. T. Pigott, Milan, Tenn., executive for Tennessee Association.

• April 13—National Cotton Ginners' Association annual meeting, Dallas Texas. Tom Murray, 714 Henry Grady Building, Atlanta, executive secretary.

• April 14-15—Valley Oilseed Processors' annual convention. Buena Vista Hotel, Biloxi, Miss. C. E. Garner, 416 Exchange Building, Memphis, secretary.

• April 14-16—Texas Cotton Ginners' Association annual convention. State Fair of Texas grounds, Dallas. Edward H. Bush, executive vice-president, 3724 Race Street, Dallas. For information regarding exhibit space, write R. Haughton, president, Gin Machinery & Supply Association, P. O. Box 7985, Dallas 26.

• April 21-23—American Oil Chemists' Society spring meeting. Memphis. For information, write AOCS headquarters, 35 East Wacker Drive, Chicago.

• May 5-6—National Cottonseed Products Association annual convention. Atlanta Biltmore Hotel, Atlanta. John F. Moloney, 19 South Cleveland, Memphis, secretary-treasurer.

• May 19-20 — Oklahoma Cottonseed Crushers' Association annual convention. Quartz Mountain Lodge, Lake Altus. Edgar L. McVicker, 307 Bettes Building, Oklahoma City, secretary.

• June 1-3—Texas Cottonseed Crushers' Association annual convention. Hotel Galvez, Galveston. Jack Whetstone, 624 Wilson Bldg., Dallas, secretary-treasurer.

• June 4-6—Tri-States Oil Mill Superintendents' Association annual convention. Edgewater Gulf Hotel, Edgewater Park, Miss. B. C. Lundy, Greenville, Miss., and Woodson Campbell, Hollandale, Miss., co-chairmen.

• June 5-7—American Cotton Congress at Harlingen, Texas, and Matamoros, Mexico. For hotel or motel reservation write: Harry Nunn, Madison Hotel, Harlingen. For general information write to Burris C. Jackson, Hillsboro, Texas.

• June 8-10—International Oil Mill Superintendents' Association annual convention. Baker Hotel, Dallas. H. E. Wilson, P. O. Box 1180, Wharton, Texas, secretary-treasurer.

• June 23-24—Joint convention, North Carolina, South Carolina and Southeastern Cottonseed Crushers' Associations. Ocean Forest Hotel, Myrtle Beach, S.C. For information, write Mrs. M. U. Hogue, 612 Lawyers' Building, Raleigh, N.C.; C. M. Scales, 318 Grande Theatre Building, Atlanta; or Mrs. Durrett L. Williams, 609 Palmetto Bldg., Columbia, S.C.

• Aug. 12-14—Beltwide Cotton Mechanization Conference. Memorial Center, Brownsville, Texas. For information, write National Cotton Council, P. O. Box 9905, Memphis, Tenn.

• Oct. 20-22—American Oil Chemists' Society fall meeting. Chicago. For information, write AOCS headquarters, 35 East Wacker Drive, Chicago.

Farm Center Hears Ray Blair

Ray Blair, chairman of the cotton department of Kern County (California) Farm Bureaus, addressed a meeting Oct. 7 of the Kern Delta Farm Center.

Blair discussed the new cotton trailer tax and the new tax on cotton. Hal Costerisan was chairman for the evening.

Big Pay Off—He Gets His Deducts

A Western Cottonoil Co. employee at Abilene, Texas, is the subject of this tale, taken from the firm's employee publication, Paymaster.

It seems that the payroll department made a mistake and issued a check to Roy Carwile for his weekly deductions instead of his salary. Roy had so much money that he was headed for the Mexican border when they caught up with the mistake.

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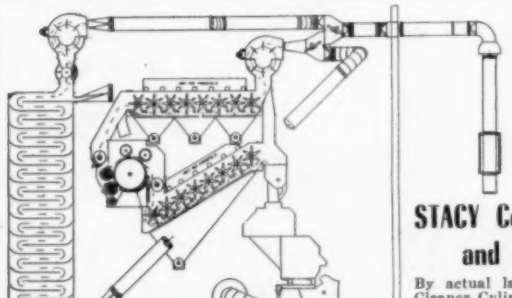


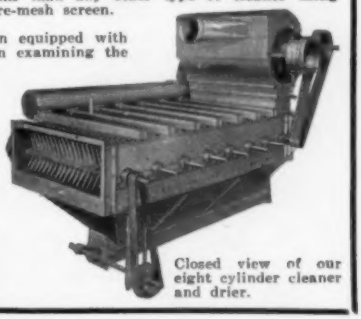
Note the hot air on the cleaners is blown through the cotton by a series of nozzles (similar to the air blast nozzles on a gin stand), forcing the dirt, leaf trash and stems through the screens. Cleaners made in any number of cylinders to meet local conditions.

STACY Cotton Drying, Cleaning and Extracting System

By actual laboratory test Stacy Spider Arm Cleaner Cylinders expel more motes, trash and stems than any other type of cleaner using wire-mesh screen.

During the past year many Stacy Cleaners have been equipped with Grid Bars instead of screens with amazing results. In examining the trash we found full cotton leaves, and practically all of the stems, sticks and trash were removed, most of which could not possibly have passed through a wire-mesh screen.

These Grid Bars are available for all Stacy Cleaners now in the field. The more leaf trash left in the cotton entering the gin stands, the greater the loss of lint at the lint cleaners, as the cotton fibres adhere to each particle of trash and is thrown off.



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Now He's a Hero!

Roosters No Longer Henyard Nuisance

Asian flu has helped to improve the status of at least one male—the rooster. The early crower in the past has been one of the most surplus of farm commodities—poultrymen selling unfertilized eggs have headed their roosters for the stewpot as fast as they could.

Now, fertilized eggs are in demand at the laboratories making vaccine used to fight the Asian flu. Thousands of roosters are being allowed to live and perform their natural function—in the interest of science.

• Cotton Quota Set, Vote on Dec. 10

A REFERENDUM for cotton growers will be held Dec. 10, USDA has announced; and the 1958 national marketing quota will be 11,920,290 bales, with an acreage allotment of 17,391,304 acres. Two-thirds of the upland cotton farmers voting must approve marketing quotas for them to be effective.

Long staple marketing quota is set at 79,022 bales from an allotment of 83,286 acres.

USDA based the quota on the following statistics: The total supply of upland cotton for the 1957-58 marketing year is estimated at 23,162,000 bales (running bales or the equivalent). This is 5,612,000 bales above the "normal supply" of 17,550,000 bales. The "normal supply," as defined in the legislation, is the current marketing year's estimated domestic consumption of 8,500,000 bales and exports of 5,000,000 bales, plus a 30-percent reserve of 4,050,000 bales.

The total supply figure of 23,162,000 bales includes an Aug. 1, 1957, carryover of 10,942,000 bales, a 1957 crop (October estimate) of 12,170,000 bales, and estimated imports of 50,000 bales.

Feed Committee Meets

National Cottonseed Products Association's Uniform Feed Laws Committee, consisting of T. C. Law, chairman; W. H. Knapp, J. R. Mays, Jr. and Louis Tobian, met in Washington, Oct 15-17.

The meeting was held in connection with the annual sessions of the Association of American Feed Control Officials. Garlon A. Harper, Dallas, director of NCPA's Division of Research and Education, attended the Washington meetings.

Staley Appoints Lukey

Albert S. Lukey will become traffic director Dec. 1 for A. E. Staley Manufacturing Co., Decatur, Ill. He succeeds T. C. Burwell, who is retiring.

Staley corn and soybean plants ship and receive 60,000 rail carloads yearly. About $1 out of each $550 of freight revenue received by railroads comes from Staley's.

■ **ESMOND P. GUE, linters dealer, has moved offices from 2423 Forest to 6839 Prestonshire Lane, Dallas 25.**

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- MODEL 108 EXCELLO GREEN LEAF, HULL AND LIMB EXTRACTOR FEEDER
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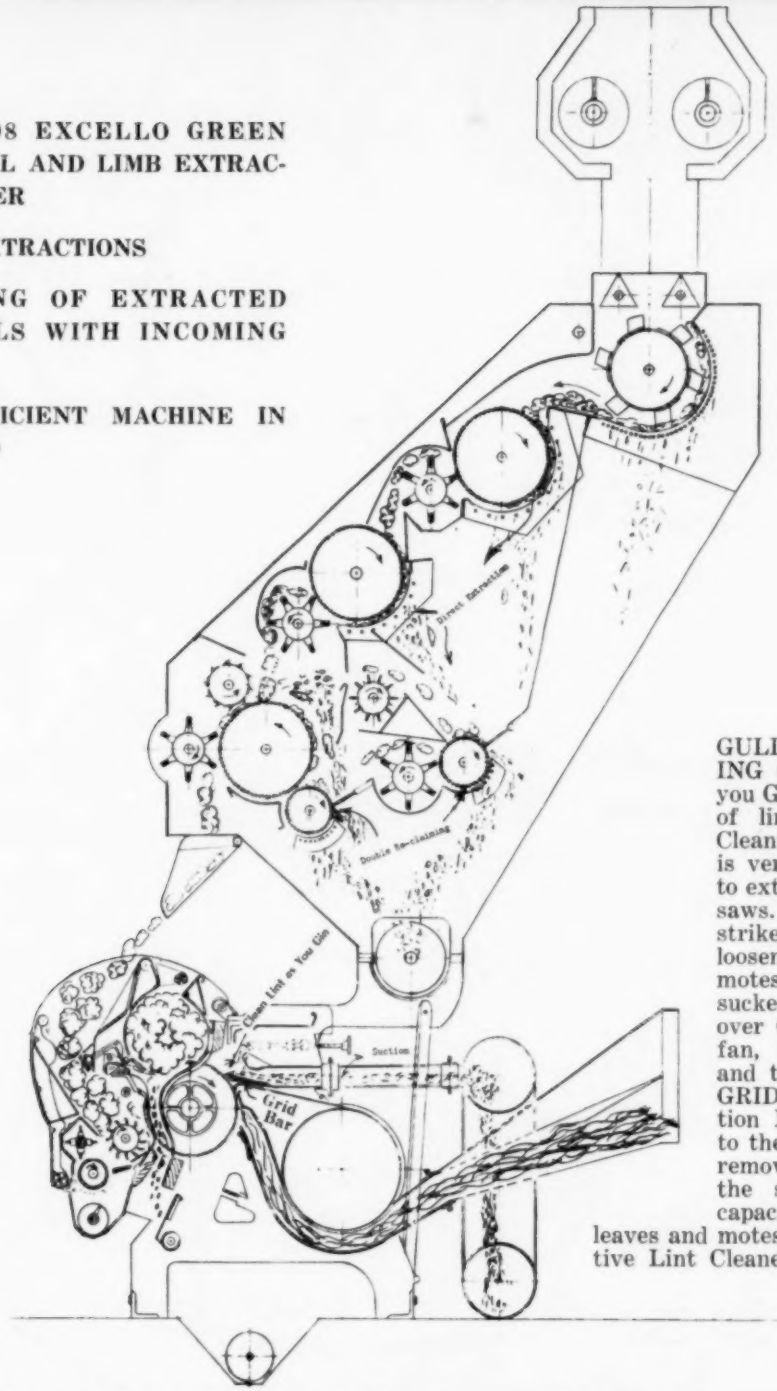
- MOST EFFICIENT MACHINE IN THE FIELD



GULLETT LINT CLEANING GINS clean lint while you GIN, because the stream of lint at the point this Cleaning System is applied is very thin, and lint tends to extend away from the gin saws. The fringe of this lint strikes GRID BARS and loosens pin trash, leaves and motes which are readily sucked up by air, drawn in over GRID BAR by suction fan, thus removing leaves and trash, also keeping the GRID BAR clean. This Suction Nozzle is very similar to the Air Blast Nozzle that removes ginned lint from the saws and has ample capacity for removing trash, leaves and motes, making a very effective Lint Cleaner within the gin.

Further information will be furnished on request from office nearest you.

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This is **NOT** an **ORDINARY** **Huller Rib**

IT IS exclusive in HARDWICKE-ETTER gins only.

IT PERMITS closer spacing of gin saws for more teeth in contact with seed roll.

IT ALLOWS free passage of seed cotton into roll box without straddling ribs.

IT OFFERS least resistance. Prevents choking and preginning. Trouble-free.

IT ALLOWS less sticks to enter seed roll. Ordinary huller ribs have over 100 square inches space opening above saws which allow almost twice as many sticks to get into the seed roll. The H-E split rib has only 55 sq. in. of opening.

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